TRACK & FIELD

CLINIC NOTES

NATIONAL
COLLEGIATE
TRACK COACHES
ASSOCIATION ☆

1958

The National Collegiate Track Coaches Association

NOTES

of the

28 th

Annual Meeting

SPRING SESSION AUSTIN, TEXAS JUNE 1957

WINTER SESSION PHILADELPHIA, PA. JANUARY 1958

EDITORS

Don Canham and Phil Diamond

DESIGN & LAYOUT
by
Don Canham

PUBLISHED BY

"Champions on Film"

303½ SO. MAIN STREET
ANN ARBOR, MICHIGAN

PHOTOGRAPHS SUPPLIED BY

Athletic Journal - Evanston, Illinois
"Champions on Film" - Ann Arbor, Michigan
Scholastic Coach - New York, New York

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NATIONAL COLLEGIATE TRACK COACHES ASSOCIATION
1957-1958 OFFICERS

President	George Eastment - Manhattan
Vice President	Don Canham - Michigan
Secretary-Treasurer	Francis C. Dittrich, Jr. - Michigan State University
Recording Secretary	Phil Diamond - University of Michigan

ADVISORY COMMITTEE MEMBERS ELECTED BY N.C.A.A. DISTRICTS

I Elliott Noyes, Dartmouth
51-52 (6 years)

II Robert S. Grieve, Syracuse
55-56 (6 years)

III Dale Ranson, University of North Carolina
55-56 (6 years)

IV Don Canham, University of Michigan
51-52 (6 years)

V Francis Welch, Emporia Teachers College
56-57 (6 years)

VI Oliver Jackson, Abilene Christian
55-56 (6 years)

VII Jim Emmerich, South Dakota State
56-57 (6 years)

VIII Jack Mooberry, Washington State
51-52 (6 years)

NO MEMBER-AT-LARGE ELECTED 1957-58

PAST PRESIDENTS on Advisory Board

Payton Jordan - Occidental College

Lloyd "Bud" Winters - San Jose State

Ken Doherty - University of Pennsylvania

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NATIONAL COLLEGIATE TRACK COACHES ASSOCIATION

Business Meeting
1957

Order of the Meeting

The meeting was called to order by President Winter at 11:00 A.M.

In the absence of the Recording Secretary, the minutes of the previous meeting were accepted as read by Secretary-Treasurer Dittrich.

Secretary-Treasurer Dittrich then read his report as follows:

1957	
209 Active Members	$ 1254.00
139 Associate Members	536.00
U of California (International Clinic)	835.00
All-American Certificates	112.00
Sale of Clinic Notes (back issues)	61.60
Balance forwarded June 30, 1956	341.46
TOTAL RECEIPTS	$ 3170.06
TOTAL DISBURSEMENTS	3044.51
Balance on hand June 14, 1957	$ 125.55

Treasurer's report was accepted as read. There was no report from the Auditing Committee.

Recommendation to Rules Committee, moved by Schlademan and seconded by Canham as follows:

> The National Collegiate Track Coaches Association recommends to the N C A A Track and Field Rules Committee that consideration be given to converting the Annual Track and Field Championships into a two-day meet. The present program to be run as now constituted except that the two-mile run shall be three-mile run and that the following events be added. The Hop, Skip, and Jump, the Two mile Steeplechase, the 440 yard Hurdles, the Hammer Throw. The Six Mile Run (10,000 meter) to be run only in Olympic years. (Passed by Majority Vote).

The Recommendation (above) was duly presented to the Rules Committee. The Committee received Mr. Schlademan cordially, and asked that the N. C. T. C. A. be sure that their Rules Committee will always consider an honest difference of opinion and give it due consideration. Nothing was done as regards the 1958 Meet. However, the Committee did consider carefully the import of the National Poll on changes and are asking that the recommendation be acted on by the various conferences involved. The conference recommendations will be considered by the Rules Committee and if changes are indicated, perhaps the 1959 meet can be used as testing ground along with the 1960 Olympic Year Meet. If the changes seem desirable they may be retained permanently.

Don Canham reported on the sale of Clinic Notes. The Clinic Notes were very worthwhile. Original expense was $2500. Report covers period from January to June, 1957. This project should be profitable to N. C. T. C. A. within next two years, by $1500.

John Oelkers, Tulane, moved that a special commendation be accorded to Don Canham for his fine work on the 1956 Clinic Notes. Seconded by George Eastment. Passed.

Stan Hiserman, Oregon, reported on possible organization of High School Coaches. He found that they were most desirous of becoming attached to our group. Discussion on report gave impression that the High School Coaches should associate with N. C. T. C. A., but maintain state organization of their own.

The membership committee, composed of all the advisory board members, was continued for another year. Motion from the floor passed.

In the absence of the Recording Secretary, George Eastment presented the revised by-laws of the N. C. T. C. A. Moved and seconded that by-laws be adopted as read. Passed.

George Eastment presented a statement which condemned the statement that Dr. Berger made of the AMA Meeting in New York. He has the statement and will send it. Seconded by Dave Rankin. Passed.

George Rider reported as Chairman of International Good Will Committee. His report will be attached to these minutes.

It was moved that the Mid-Winter Clinic be held in New York City. No date was set. Passed.

Nominating Committee presented the following slate of officers for 1957-58.

President	George Eastment
Vice President	Donald Canham
Secretary-Treasurer	Fran Dittrich
Recording Secretary	Phil Diamond

Bill Bowerman moved that the slate he elected by acclamation. Oliver seconded-motion was passed.

George Eastment took over the chair from Bud Winter and assured Bud and the membership that he would try to continue the good work Bud had started.

George Eastment appointed Bud Winter as a committee of one to check the possibilities of a trade Journal. He also stated that there was a need for a better liaison between the track coaches and the Rules Committee. He was going to try and bring this about.

For the protection of the membership at large, George Eastment suggested that the N. C. T. C. A. be incorporated. He also suggested that it be incorporated in Michigan. This was put into a motion by Don Canham, seconded by George Rider and passed.

Meeting adjourned at 12:30.

Respectfully submitted,

F. C. Dittrich, Jr., Secretary

REVISED BY-LAWS OF THE
NATIONAL COLLEGIATE TRACK COACHES ASSOCIATION

Article I

Name and Purpose:

The name of this organization shall be the National Collegiate Track Coaches Association (NCTCA). Its objects shall be to foster Track and Field athletics in the high schools, colleges and universities in all matters pertaining to the maintenance and improvement of our National Track and Field program; to conduct annual clinics for coaches and officials; to place at the disposal of coaches sources of Track and Field information; to have a representative group of Track and Field men in which problems of general interest may be discussed and to which they may be referred for interchange of ideas; to strive for proper and adequate publicity and good public relations; and to encourage participation in Track and Field activities, both intramural and extramural, in all the educational institutions, athletic clubs and industrial and military recreation programs all over America.

Article II

Membership:

The membership of the NCTCA shall consist of three categories as follows:

(a) The Active membership shall include college and university coaches, their assistant coaches and/or any member of the athletic staff of a college or university. Each active member shall pay dues of $7.00 per year. He shall have the privilege of discussion and voting at all meetings of the Association and shall receive all publications of the Association under the terms decided upon by the Executive Committee. Active Membership is on a year-to-year basis and shall be automatically cancelled by non-payment of dues.

(b) Associate membership shall include high school or preparatory school coaches, assistant coaches, officials or any member of a secondary school athletic staff. Each associate member shall pay dues of $5.00 per year. He shall receive all publications of the Association under the terms decided upon by the Executive Committee but shall not have the privilege of discussion or voting except by express permission of the presiding officer. Associate membership is on a year-to-year basis and shall be automatically cancelled by non-payment of dues.

OR other individuals or groups interested in promoting track & field.

(c) Honorary membership may be conferred upon those members, who, in the opinion of the membership, have made outstanding contributions to the sport of Track and Field or the NCTCA. This shall be construed to include (1) active college coaches upon retirement; (2) head Olympic coaches; (3) any others whom the membership may select as worthy of the honor. Recommendations for Honorary Membership must be made through the President or Secretary-Treasurer, must be approved by a majority of the Executive Committee and individually voted upon by the membership. Honorary membership shall be for life, revocable only upon direct action of the membership. Honorary members shall not be required to pay dues but shall have all the privileges of active members.

Article III

Amendments:

These by-laws may be amended or revised by a two-thirds vote of all eligible members voting at any regular meeting. Proposed amendments or revision shall be submitted in writing to any member of the Executive Committee at least thirty (30) days prior to the regular meeting. No amendment shall be approved at the first meeting at which it is presented unless the membership has been notified of its gist and purport at least fifteen (15) days prior to such meeting.

Quorum:

(a) A majority of the NCTCA Executive Committee ([redacted]) shall constitute a quorum with each member of the Committee having one vote. Votes sent in by mail shall be considered valid.

(b) A minimum of twenty-four (24) eligible members shall be held to constitute a quorum for voting in regular meeting.

Article IV

Officers - Number of, Election and Duties:

(a) The officers of the Association shall be a President, a Vice-President, a Secretary-Treasurer, a Recording Secretary and an Executive Committee which shall consist of the ~~four~~ officers mentioned above, nine (9) ~~Advisory Boardmen~~ (one from each NCAA district and one member-at-large) and the ~~three~~ most recent Past-Presidents of the Association.

(b) The President, the Vice-President, the Secretary-Treasurer and the Recording Secretary shall be elected at the June meeting each year and shall take office at the close of the meeting at which they are elected. Three members of the ~~Advisory Board~~ shall be elected every two years at the annual meeting for a full term of six (6) years. Any vacancies which may occur during any year shall be filled by a special election held at the annual meeting immediately following. Members so elected shall serve the unexpired portions of the men they replace.

(c) The Duties of the Officers shall be as follows:

(1) The President shall (a) preside at the annual meeting following his election; (b) act as ex officio member of all committees; (c) with the consent of a majority of the Executive Committee call special meetings, general or regional, when he considers it necessary; (d) appoint an Auditing Committee and a Nominating Committee before the annual meeting over which he presides; (e) perform any other duties which the Executive Committee may from time to time designate; (f) serve as Chairman of the Executive Committee during his term in office and as a regular member of that Committee for a period of three (3) years following the close of his term in office.

(2) The Vice-President shall (a) fulfill his duty as member of the Executive Committee and any other committee(s) to which he shall be named; (b) act as surrogate for the President in case of absence or incapacitation; (c) plan and preside over the Annual Clinic of the NCTCA; (d) direct, under the supervision of the President and ~~Executive Board~~, all NCTCA activities in the respective districts including clinics, state associations and other events held under the name of the Association. He shall be empowered to appoint a Committee to assist him if he so desires.

(3) The Secretary-Treasurer shall (a) act as repository for all minutes, records and publications of the Association; (b) be the chief fiscal officer of the Association. He shall handle all routine business and have the custody of all the funds, papers and documents. He shall receive dues and other payments and deposit them in the name of the Association; (c) keep accurate books of account of all transactions, which books shall be the property of the Association and together with all other of its property in his possession shall be subject at all times to the inspection and control of the Executive Committee and/or the Auditing Committee.

(4) The Recording Secretary shall take the minutes of all meetings and a record of the Annual Clinic and any other clinics which the Association may hold or sponsor. The minutes and the Clinic Notes shall be published annually under his editorship.

(5) Members of the ~~Advisory Board~~ shall (a) serve as members of the Executive Committee; (b) act as regional chairmen, representing the NCTCA in organizing local or regional clinics; (c) act as a Membership Committee to build and maintain NCTCA membership. They shall work for the formation of Track and Field associations in their respective districts; (d) receive dues and forward them to the Secretary-Treasurer and canvass their districts constantly for new members and ideas. Each member of the ~~Advisory~~ Board shall give a report of his activities at the annual meeting.

Article V

Committees:

(a) The Executive Committee as above constituted (see Article 4a) shall be the Association's governing body. It shall serve as the NCTCA agent in all matters pertaining to the national program of college Track and Field Athletics.

(b) The Auditing Committee shall consist of three (3) members appointed by the President in advance of the annual meeting. They shall make an annual audit of the Secretary-Treasurer's books before the annual meeting and shall report their findings during the business session.

(c) The Nominating Committee shall consist of not less than three (3) or more than five (5) active and/or honorary members appointed by the President in advance of the annual meeting. It shall be their duty to select from a roster of eligible members furnished by the Secretary-Treasurer, a slate of candidates for the annual elections. The slate shall include nominations to fill any vacancies which may occur in the ~~Advisory Board~~ EXECUTIVE COMM. These nominations, when completed, shall be presented to the President, who, after calling for nominations from the floor, shall hold an election with all active and honorary members present eligible to vote.

(d) In addition to the aforementioned Committees, the President or the Executive Committee has the power to appoint any other Committees deemed advisable or essential to the welfare of the Association and the sport we represent.

Article VI

Membership Dues: (See Article II)

(a) The annual dues for Active membership shall be $~~4~~7.00 due at the time of the annual meeting and in any case payable before January 1st following the meeting.

(b) The annual dues for Associate membership shall be $~~5~~6.00 due at the time of the annual meeting and in any case payable before January 1st following the meeting.

(c) The Secretary-Treasurer, upon receipt of the year's dues, shall mail the paying member a receipt and an NCTCA membership card on which will be inscribed the member's name, address and position as well as his membership status. In addition he shall send such other items that are part of the membership (ie ~~decals~~ decals etc)

Article VII

Association Finances:

(a) The Secretary-Treasurer shall have the power to draw on the treasury for the following purposes: (1) In payment of necessary operating expenses including National Collegiate Athletic Association dues; (2) To defray his personal expenses in traveling to and from all regular and special meetings of the Association; (3) In payment of any other NCTCA obligation authorized by the Executive Committee.

(b) The Executive Committee has the sole power of approving or rejecting any other proposed disposition of Association funds.

Article VIII

Meetings and Agenda:

The second meeting shall be held in conjunction with the winter NCAA meeting

There shall be ~~one~~ TWO regular meeting of the Association each year. ~~This~~ ONE meeting shall be held IN JUNE during the week of the NCAA Track Meet, in the city in which the meet is held, at a place to be named by the Executive Committee. ~~The Annual NCTCA Clinic shall be held during the same week.~~ TWO CLINICS SHALL BE HELD EACH YEAR. ONE IN JUNE AND THE OTHER DURING THE WINTER NCAA MEETINGS.

In addition to ~~the~~ THE regular meeting of the Association, the President or the Executive Committee may call a special meeting whenever the welfare of the Association or the sport we represent warrants such action.

In general, the usual order of business at the annual meeting of the membership shall be as follows:

1. Report of the Recording Secretary including the reading of any unapproved minutes.
2. Report of the Secretary-Treasurer.
3. Report of the Auditing Committee.
4. ~~Reports by each member of the Executive Committee.~~ BY THE EXECUTIVE DIRECTOR.
5. Other Committee Reports.
6. ~~Vote on the mid-winter Clinic.~~
7. Old Business.
8. Report of the Nominating Committee.
9. Election of Officers.
10. Installation of the new officers.
11. New Business.

Article IX

General:

The Track and Field News, published monthly, shall be the official organ of the Association and shall be mailed to all NCTCA members. The annual dues shall include the subscription cost of this publication.

IV

Article IX

GENERAL

I The annual dues of the N.C.T.C.A. shall entitle the member to (a) a membership card
(b) a copy of the official clinic note published during that year
(c) certain special items as determined by the Executive committee to designate members (i.e. car window decals etc)
(d) a voice and vote in U.S. Track & Field affairs
(e) Admission to all meetings and clinics held by the N.C.T.C.A.
(f) Publications on track and field may be part of the membership if the executive committee so determines.

II Certificate shall be awarded by the N.C.T.C.A. to member institutions and individual athletes who are selected to the N.C.T.C.A. All American track team. Three men in each event shall be selected to the team. The selection shall be made immediately following the N.C.A.A. [illegible]

1957 ALL-AMERICAN TEAM

Following the National Collegiate Championships at Austin, Texas, on June 14th and 15, 1957, the N.C.A.A. Rules Committee elected the following All-American Team for 1957. A Certificate is awarded to each member of the team by the National Track Coaches' Association. The selections for each event are listed alphabetically, not in preferential order.

DISCUS THROW	
Rink Babka	U of Southern California
Al Oerter	Kansas
Fred Peters	Stanford
POLE VAULT	
Don Bragg	Villanova
Bob Gutowski	Occidental
Ron Morris	U of Southern California
HIGH JUMP	
Phil Reavis	Villanova
Don Stewart	Southern Methodist University
Al Urbanckas	Illinois
SHOT PUT	
Ken Bantum	Manhattan
Dave Owen	Michigan
Don Vick	UCLA
JAVELIN THROW	
John Fromm	Pacific Lutheran
Bob Voiles	U of Southern California
Ken Yob	Colorado
BROAD JUMP	
Greg Bell	Indiana
James Gamble	Prairie View
Joel Wiley	Los Angeles State
ONE MILE RUN	
Don Bowden	California
Ron Delany	Villanova
Jim Grelle	Oregon University
440 YARD DASH	
Glen Davis	Ohio State
Robert McMurray	Morgan State
John Telford	Wayne
100 YARD DASH	
Leamon King	California
Bobby Morrow	Abilene Christian
Ira Murchison	Western Michigan
120 YARD HIGH HURDLES	
Lee Calhoun	North Carolina
Elias Gilbert	Winston Salem
Ancel Robinson	Fresno State
880 YARD RUN	
Don Bowden	California
Ron Delany	Villanova
Dave Scurlock	North Carolina
220 YARD DASH	
Ed Collymore	Villanova
Leamon King	California
Bobby Morrow	Abilene Christian
TWO-MILE RUN	
Bob House	California
Charles Jones	Iowa
Max Truex	U of Southern California
220 YARD LOW HURDLES	
Elias Gilbert	Winston Salem
Aubrey Lewis	Notre Dame
Ancel Robinson	Fresno State

SCIENCE AND TRACK AND FIELD

-- Ken Doherty
University of Pennsylvania

All about us we hear demands for more and better science as a means to progress as well as to maintaining our proper position in a highly competitive international field. Track and field athletics should be no exception is this respect. This is true not merely from the standpoint of improving performance in our sport, but even more important, in clarifying the relationship between sports participation and physical and mental health.

We are most fortunate in having Dr. Ernest Jokl with us today; he always stimulates our thinking and gives us new insights into the outcomes of recent scientific work. But we also need to bring men from other sciences: from nutrition, bio-chemistry, psychology, mechanics.

There must be a sense of urgency about this, not merely because of the challenge of a great international rival, not merely because of our present concern for national muscular fitness, but rather because a knowledge of science is now essential to a sound understanding of sports and of the athletes we are working with. We can no longer hide behind the time-worn statement, "My method works; it must be good." For others, through science, are finding even better ways that produce even better results.

Comparisons with others are often irritating; yet it is a fact that the Central Physical Culture Research Institute of Moscow recently celebrated its 25th anniversary. To quote an article [1] by R. Sverina of Russia which recently appeared in the Bombay, India magazine, Sport and Pastime:

> Hardly any other research institution in the country has a staff of research workers of so many different professions. One finds there not only trainers and coaches in various sports but also doctors, teachers, physiologists, psychologists, biochemists, inventors of intricate machines for testing and experts in the organization of mass participation....Teaching and training methods are elaborated scientifically with the men of sciences closely co-operating with athletes possessing practical experience. Many prominent sportsmen and coaches are drawn into this work.

Science is of course no substitute for practical experience and it may well be that Russia's track and field athletes were over-coached and overly science-conscious at the 1956 Olympic Games. But this is quite likely to be corrected at Rome in 1960.

We have no such centralized research institute for sports in this country. Perhaps we do not even want it as such. In the long run, freedom to conduct research at the individual institution level will provide best results. But freedom to do research requires money, facilities, equipment that are not normally available to the individual institution. Further it requires the stimulation of thinking and investigation that can only come when groups of men gather together to discuss and probe and argue the many facets of any given problem.

Think of what has come out of Princeton University as a result of the establishment of its Institute of Advanced Study. It has made no national decrees; it has placed no restrictions upon the research of individuals or institutions; on the contrary it has stimulated research everywhere in the world.

In similar fashion, we need an Institute or at least an Information Center for Sports Research. Until such a Center is available, we must ally ourselves with individual workers interested in sports, of which there is a larger number than we ordinarily realize, and with such organizations as the American College of Sports Medicine whose purposes are allied to our purposes and whose work can be of direct benefit to us. If one were to examine a list of its members, we would find most of the names of scientists doing research in sports in this country, men like Morehouse of UCLA, Montoye of Michigan State, McCloy of Iowa, Wolffe of the Valley Forge Heart Institute, Steinhaus of George Williams, and many others. Membership to this college is open to us, to all having the degree of Master of Arts or Science (or a higher degree) in fields related to physical education. To date the work of this College has been helpful to sports; its attitudes, sympathetic and respectful toward the coaching profession. One of its members [2] wrote recently:

> It is my general impression that coaches have much to offer scientists interested in the advancement of human performance and welfare. Coaches working every day with selected individuals and attempting to achieve maximum performance in sports become familiar with the elements that make for success and those which represent limiting factors. Scientists working in laboratories do not have this wealth of observation. Coaches originate new methods of training and caring for athletes which in themselves represent dramatic discoveries in the nature of the function of the human body....I feel that much could be gained by promoting among coaches the attitude that they both have a great deal to learn from and a great deal to give to scientific personnel and educators.

But my main purpose in talking with you today is more specific than this; my topic is "New Research in track and field" and in the short time that is permitted I wish to outline certain work that others are doing which has a direct value for sports performance.

This is by no means a survey of new research; rather it represents quite arbitrarily certain bits of knowledge that have come to my attention and that seem particularly appropriate and timely. I suppose none of this is new in the true sense of the word. Each of us will have a tendency to say, "I've known that or I've been doing that for years."

And yet each research, if it is worthwhile, permits a better organization of the old or a more precise understanding of methods, ideas, materials, and most important of all, men.

Of many possible topic areas, three seem most important: (1) circuit training, (2) muscular strength training, and (3) endurance training, both muscular and cardio-vascular.

Obviously time does not permit a detailed presentation of material. Rather it is the intent to summarize conclusions that have been reached and then furnish documentation of supporting research to be published in the final report of these meetings.

The first of these, Circuit Training, is not a research study as such, but is, rather, the result of research. In summary, it is an attempt to make strength-endurance training more interesting and more effective.

As described in the 1957 English publication by this same title, Circuit Training, [3] it is the invention of two co-workers, R. E. Morgan and G. T. Adamson, in the University of Leeds, England. Its purpose is the development of all-round fitness or, to use the author's phrase, to develop a "hard core of fitness" for all physical activity, not for the special fitness required for any special sport or activity.

It utilizes such common exercises as pull-ups, push-ups, rope swings, barbell presses, curls, lateral raises, sit-ups, bench-stepping, squat jumps, burpees, rope and ladder climbing, etc. Altogether some 25 exercises are illustrated and described, none of which are in any way new.

But these exercises, or any others one might wish to use, are organized in such a fashion as to motivate their use every day. Performance is scored in two ways, (1) by reference to scoring tables or (2) by the time required to make the circuit of exercises at a less than maximum level, for example at a 60% of maximum level.

To take an example applicable to our sport, about 10 exercises would be selected which would develop muscular strength, endurance, and flexibility as well as circulo-respiratory efficiency. Apparatus would be erected around a small gymnasium or out-of-doors near the track and field. After several preliminary sessions, athletes would test themselves on maximum performance in these events.

After that, performance in each event would be only 60% of maximum, but would be scored on the basis of the time required to complete the entire circuit of 10 events. Events would be selected so that total time required would entail only about 10 minutes.

In general such activity would occur at the end of each day's training session, though some use the circuit as a warm-up device as well. In this way, the spirit of competition enters into strength training, competition against oneself, but more importantly, on an equalized basis of competition against others.

It has been our experience at Pennsylvania that, though we have urged strength training and have provided facilities for it, only the more enthusiastic men have trained consistently and on a basis of gradual development. Circuit training would seem to provide a motivating force formerly lacking. We intend to make the most of it.

It is our very strongly held opinion that maximum performance in specific skills, in specific strengths, in specific endurance is only possible when based upon a broad and solid foundation of all-round strength, endurance and flexibility. To date, circuit training seems to provide the most interesting and sound method of acquiring such a foundation. Each coach can erect his own circuit in terms of his own ideas and available space, equipment and time; each athlete can work at his own convenience, his own ability and condition. It can be made very simple in every way to erect, to organize, to administer; or it can be very complex and comprise the major portion of a day's exercise period. It can be adapted to regular physical education classes, or to a specific sports group.

It is in no way a substitute for training in skill or endurance in a given event; it is not a means of teaching any phase of track and field techniques. But it should aid in the prevention of injuries, should provide for a hard core of fitness for any sports event, and in any case should add some fun to track and field training that is basically hard work.

The second area selected for discussion is that of muscular strength training. Here I must be careful not to enter the field of Weight Training which Irving Kintisch will describe so well later this afternoon. I assume that Irv will speak of dynamic contractions, of strength exercises involving movement.

But there is another type of strength training which involves static contractions. To state the case quickly I shall quote [8] from a recently published pamphlet, HOW TO KEEP FIT AND LIKE IT by Arthur H. Steinhaus, professor of physiology at George Williams College, one of the most respected physiologists of exercise in our country:

> A muscle that is just able to lift 100 pounds will be stimulated to grow when it is exerted to lift about 40 or 50 pounds or about half of its maximum strength. Recently it was discovered that only one such contraction held momentarily only once a day makes muscle strength grow just as fast as it possibly can. Repeating the exercise several times a day has no further effect.

That's a most amazing statement, almost incredible. Later in the booklet, Steinhaus describes a set of 13 tension exercises which require no expensive barbells, in fact no equipment at all, and yet which build strength as quickly as it can be built. For example, Ex. 2, the Hand Push: stand with palms touching and the elbows at shoulder height. Press palms hard together for one second. Or Ex. 6, the Grip: while standing grip both hands as hard as possible.

Frankly I had certain doubts about Dr. Steinhaus' somewhat unqualified statement, but after reading the research material [6, 7, 9, 10] which he very kindly sent in answer to my letter of inquiry, and which will be included in the bibliography, it seems clear that there is a basic and sound truth in these statements which is certain to modify our strength training of the future.

They are based upon experiments that go back 50 years and more to the work of Professor Morpurgo [4] of the University of Siena, 1897, but primarily upon the experiments of a group of researchers under Dr. Erick A. Muller [5] of the Max Planck Institut für Arbeitphysiologie in Dortmund, Germany. For more than a decade they tried to discover the fastest way to increase muscle strength. In one series, seventy-one (71) separate experiments were performed on 9 male subjects over a period of 18 months. One article, [6] titled, "The Regulation of Muscular Strength" by Dr. Muller lists 26 research references to support its conclusions.

This is no mere statement of opinion, or the incautious conclusions of a hurried bit of study. On the contrary, it is carefully documented research which, within its admitted limitations, we must recognize and utilize to our best advantage.

Obviously sports always involve activity, dynamic activity, never static. Repeated contractions involving a certain degree of endurance are always present. Even in the weight events (shot, discus, javelin) at least 6 efforts must be made in competition.

Tension exercises (a better term, I think, than static exercises or isometric weight training) do not develop endurance. One research series found that although strength was increased from 64% to 97% of maximum, endurance was not affected. Apparently there was no increase in blood supply.

As Dr. Muller, [6] points out:

> "A strong muscle does not mean better performance in practice whether in sports or in daily work. Skill and an appropriate adaptation of ventilation and circulation to the increased muscular power must be acquired by other ways than by static muscular training."

But it seems clear that tension exercises have certain special values and that we shall adopt them as a part of our accepted training programs, along with weight training and specialized types of endurance training.

One of the objections to barbell-dumbell-gymnastic work is the very limited range of muscle groups which they involve. We do a lateral raise for strength of shoulder muscles, but shoulder muscles permit a great range of movement and a complexity of muscle fiber-groups that dumbell exercises are not likely to reach.

In contrast, any door casing, chair, or table provides an almost unlimited range of shoulder strength exercises.

There are of course many secondary conclusions to be drawn from such extensive research. For example:

> "Strength that is increased by daily training is lost in about the same time that was required to build it up. A short training period induces only a "loosely anchored" adjustment of the muscle to the increased demands made upon it. If however this increased strength is maintained for a time it becomes fixated or anchored in the muscle."

> "After extensive daily training, a given level of strength can be maintained for longer than one year by strength training once every two weeks. We don't know yet the reason for this fixation of strength gained by slow training."[6]

Or, to take another example:

> "Summarizing their work, one can say that the eating of plenty of meat in order to assimilate muscular substance is only necessary for a man after a long period of insufficient protein intake....In a state of normal food intake, there is so much protein stored in the body that an increase in muscular tissue by training is possible without any special protein intake. Special experiments have shown that the training effect cannot be speeded up by increasing the protein intake over the normal limits under normal conditions.[6]

The third area of research to be summarized here is that of endurance training and its possible effects upon the long-time health and longevity of the runners involved.

The system of interval training for endurance running, now being followed by almost everyone, is primarily based upon a principle of overloading whereby any given workout produces as many states of high oxygen debt as time and individual fitness will permit. Repeated bursts of high speed running are interspersed with very short periods of restful jogging. Most jog about 3 to 5 minutes; some as little as 30 seconds. Repeated and ever-increasing loading as the workout progresses is presumed to produce ever-increased resistance to fatigue.

We are all following this system, not because science has found it most efficient, not because we understand its precise meaning, but rather because it has been found to work and because such "authorities" as Bannister, Chataway, Harbig, or Franz Stampfl have used it.

But whether Delany's 16 interval 440s increases endurance faster than Bannister's 10 440s is not known. It may, but also, as with the strength training just outlined, it may have no additional helpful effect at all. To date, the only bases for judging how much is best from both a training and a health standpoint are the feelings of the runner and the very fallible judgment of a coach who often is working with numbers of men in different events at the same time.

In general we tend to assume that better training is primarily a matter of more training. The more cautious of us emphasize gradual development with a minimum of stress at any one time. The most extreme tend to brush aside all limitations and, to quote one prolific writer, advocate a regime of "all-out everyday". A very few may even resort to hypnosis and certain "ergogenic aids", to use the nicer term, to help the trainee ignore the limiting "feelings of fatigue."

To an important degree we are supported in these efforts, though I'm sure we alone are responsible, by such good friends as Ernst Jokl, [11] M.D., who tells us,

> "The normal heart is invulnerable to the demands and stresses of physical exercise and athletic training. This statement is unqualified....It applies to every kind of muscular effort."

or to quote Arthur Steinhaus, Ph.D.:[12]

> There is no evidence that a normal heart may be permanently injured by exercise, no matter how strenuous....All observed cases of death due to circulatory failure occurring while the deceased was engaged in strenuous work have turned out to be cases in which the victim's heart or circulatory system had previously been seriously damaged by disease.

Such statements are most comforting to us and seem to leave the door wide open for us to do what and as much as we please.

But unfortunately they are not the whole of the story. Other men working in other fields and from different points of view seem to at least suggest that caution and a certain deliberate haste is the soundest policy for the welfare of our athletes and of our sport.

At an important symposium on Stress held in Washington, D.C. in 1953, Dr. Wallace O. Fenn,[13] one of the most respected research workers in the field, stated that the story of Pheidippides, who allegedly killed himself by carrying the news of victory from Marathon to Athens, could have been an actual occurrence:

> "Certainly it requires strong motivation to run one's self to death. Under ordinary circumstances the afferent impulses from the exhausted muscles play a prohibitive role at the ventral horn cells and the efferent impulses are stopped at the barrier or some more central point....Nevertheless it is not impossible for the brain to drive the muscles hard enough that the machine breaks down and the brain itself succumbs in the common catastrophe."

Or to quote Hans Selye, M.D.,[15] internationally renowned scientist in the field of human stress,

> "Adaptability (to conditions of stress) can be well trained to serve a special purpose, but eventually it runs out; its amount is finite."

On the basis of his work with non-human animals, Selye groups "forced intense muscular exercise" along with disease, infection, and worry as being a stressor agents which, given time and many repetitions, tend to lead to exhaustion of reserves of energy that are fixed and limited, to aging, and to an earlier death.

Of course human beings do not always follow the patterns of reactions of other animals; we like

to believe we are much tougher and more adaptable; and, in any case, applications of theory must always be individualized.

But there still remains sufficient evidence and sufficient doubt as to the outcomes of continuous hard work to make good coaches maintain at least a light rein upon the intensity of both training and competition.

Further such contrasting evidence emphasizes our great need for more scientific research in these areas. There needs to be a specific organization or institution to stimulate and guide such research and our National College Track Coaches Association should be a leader in furthering its establishment.

In the meantime, we must continue to seek the services of such fine scientists as Dr. Jokl[14] and co-operate with such research organizations as the American College of Sports Medicine.

Future progress in our sport will depend more upon science and research than upon any other one factor.

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ASPHALT FIELD EVENT SURFACES

-- Dave Rankin
Purdue University

In the fall of 1953 the surfaces for the high jump, pole vault, broad jump, shot put, and discus were constructed. The asphalt mat was originally developed by Ed Weir of the University of Nebraska. The Purdue Athletic Department thought enough of the idea to use the mat for all field event surfaces.

The purpose of using the asphalt mat was to provide a solid footing under all weather conditions and varied temperatures. After three years of use fall and spring the project has satisfied all objectives. The footing has been suitable in and after rain, and during hot and cold temperatures. After three years of use fall and spring practice and four meets a year, the areas are still suitable and need no repair. There has not been one case of shin-splints. The compliments of visiting athletes have been most satisfying..

If you attempt to put down asphalt mat at your particular school, you should locate a reliable asphalt company and talk over the desired results with the foreman. The better understanding the foreman has of your desires and rule requirements the more satisfactory the results. Your area weather conditions will no doubt influence the sub-surface of the formula mix coat. Our sub-surface was based on an average frost-line of 30 inches. The next step is to establish a finish grade level for each area to be covered. Being a permanent type footing, it is necessary to establish grade levels that will not have to be changed in the future to meet rule requirements. It is not necessary to crown runways and such to keep off water as long as the surrounding ground is not higher than the mat. The surplus water can easily be broomed off after rain. Our particular project was started eight inches below finish grade level to allow five inches of No. 3 crushed grated stone, two inches of asphalt binder, and one inch of the special formula mix as top dressing. The five inches of crushed stone allowed a good base for the asphalt binder, and one that would not heave with winter freezing and thawing. The two inches of asphalt binder is the same composition as asphalt binder used in macadam road. The crushed stone, asphalt binder, and formula mix were rolled with a five to seven ton roller. Making each surface, as you go, as level as possible helps to accomplish the final result. Asphalt men are not usullly working to such a fine level, so it is advisable to be around during the operation constantly reminding the foreman of the desired results. The crushed stone and asphalt binder can be started or stopped at any point. Once you start putting on the formula mix it should be continued for each full area. It is more desirable to put down the formula on a hot day. The hand working necessary for finishing is best accomplished while the mix is in the hot stage. The five events that you could possible cover can be accomplished in a day's time--not a half day. The formula mix is as follows:

A-1 Sheet Asphalt - One Ton - One Batch
700# Blow Sand
930# Plaster Sand
180# Stone Dust
190# Asphalt Cement

60-70 Pentration

It is not advisable to substitute for materials. Each material is for a specific reason and the final result will justify its use. Should one of the mats be above ground, be sure and cover the exposed sides with dirt or sod to keep moisture out. Concerning the discus, high jump, and shot put areas, it is advisable to make mats larger than desired and trim them to desired size with air hammer. The roller going on to and off the mat may break down the edges.

Now to quickly cover the various events:

High Jump - Our mat has a radius of twenty-five feet. I think this is a minimum requirement of radius, and allows the last two or three strides on the mat before take-off. Be particular about finish coat level ten feet radius from standards. The board spike 1/8 inch is adequate for excellent block, and even rubber soled warm-ups are good.

Broad Jump - Our mat is 8' x 150'. We had concrete curbing, so used same. Think 5' x 125' excellent. If not too narrow, one can use the sides for checking step which gives all of mat equal and more lasting use. The board was installed before any of the three operations were started. This allowed good support and getting the finish coat level to back of board. The board spike 1/8 inch is adequate, and rubber soled shoes can be used much of the practice session and warmup.

Pole Vault - Our mat is same as broad jump. A metal box installed just before the asphalt binder coat was put down. The finish coat was brought up very satisfactorily to the edges of the box. The 5' x 125' will give one a chance to use the sides for checking step and thus save some of the traffic down the middle as in the broad jump. The broad spike 1/8" is adequate, and rubber soled shoes are about as good.

Discus - Our mats are 12' x 24' with two circles evenly spaced. One circle would be adequate, as it is a bit dangerous for two men to practice throw at the same time. Four holes are drilled in the flat circle and spikes are driven down through mat. This has been a very satisfactory arrangement. We permitted only rubber soled shoes, as the turn would excessively tear up mat. It is important to scrub mat before competition as dirt and dust make the rubber soles skid. Advisable to have coco mat close to asphalt mat to wipe off feet each time before going on mat.

Shot Put - Our mat is 12' x 30' with two practice circles and one used only for competition. I think two circles are ample. Same information as in the discus is true.

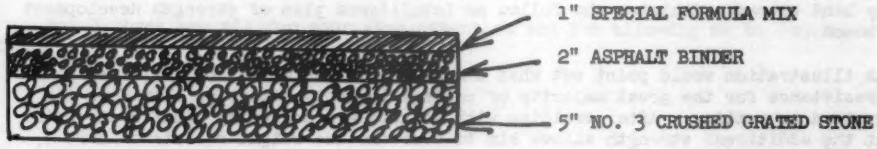
The following conclusions have been left out of the foregoing information. Do not drop any gasoline or such substance on the mat, as you will have a soft spot and have to replace the area. This is especially true, and should be watched carefully, when the roller is in operation. The friction of the surface of the formula mix is adequate to use rubber soled shoes much of the time, and all of the time in the shot put and discus. The 1/8" board spike is adequate, as we have tested the 1/8" and 1/4" spike, and the surface will provide longer use with the 1/8" spike. The penetration of the mix is good, and gives a good firm surface in all temperatures. The competition results have been good in all events. For repair in a definite area, it is possible to remove and replace the top surface.

I have neglected to quote any specific prices as they will differ greatly in all parts of the country. I think you will find it reasonable and much to your liking. It certainly gives field event men a chance to work in all kinds of weather and does not disrupt your home meet when rain suddenly appears. Your areas will be ready for use always, and no contestant feels like he is not thought of because his area has not received recent maintenance.

I would be glad to add any points I might have left out, should you care to write. Also, I would like to coordinate your problems and suggestions should you join the group that is trying the asphalt mats.

THE CONSTRUCTION OF THE NORTHWESTERN
ASPHALT RUNWAYS

by "Rut" Walter



--You will notice that our special mix is the same as Purdue's, but our penetration is different.

A- 1 SHEET ASPHALT - ONE TON ONE BATCH.

700# BLOW SAND
930# PLASTER SAND
180# STONE DUST
190# ASPHALT CEMENT
70-85 PENTRATION

WEIGHT TRAINING

-- Irving Kintisch
Manhattan College

Gentlemen:

Something old has been added to track and field training. Finally after a great many years of being conducted in the dark corners of various gymnasia, after being derided by athletic coaches, the use of barbells in sports has finally come into its own. I want to quickly point out that I am not talking about the sport of weight lifting nor am I the least bit concerned with the muscular young men who pose or compete for Mr. America honors. What I am referring to is the use of weights as resistance as used in strength development.

These weights might be barbells, dumbbells, wall pulleys or any other implement that is adjustable in weight. Since they are adjustable in terms of being made lighter or heavier, I should like to refer to these exercises as progressive weight resistance exercises.

The subject of strength has intrigued physical educators and athletic coaches for a great many years. The literature bulges with material on various aspects of this interesting topic.

I'd like to confine my remarks today to the problem of strength development as it is related to the sport of track and field.

I believe it is no longer necessary to list the names of present and past champions who have used weight resistance exercises in order to impress. If I were to read such a list, I'm sure I'd find more than just a few of their coaches sitting in this room today. As I look about, I see former great athletes whose names would have been included on such a list.

It is an anatomical fact that the number of muscle fibers in the body are not increased by training. What does happen is, that with regular and strenuous exercise, the muscles will increase in size and strength.

Muscle groups in the body come in all sizes and shapes. The muscle fibers however are generally long and narrow. In order to develop strength, the muscle must work at or close to its capacity load. Unused fibers or fibers that are small because of little use are brought into play. They develop because of the increased demand placed upon them. When activity breaks down some components of the muscle, the body over-compensates in replacing the material. And too, there is a great increase in capillarization in the area. To continue to develop strength, the exercise must be conducted against increased resistance. The measure of strength is the amount of weight resistance that can be overcome.

Repetition of the exercise will increase endurance but not strength.

Long time arguments against weight training included those that an athlete would be "muscle bound" and lose his speed. I think the term "muscle bound" developed as a result of those lifters who concentrated on developing one set of muscles and neglected its antagonistic group. For example: an overpowering bicep and an underdeveloped tricep would nearly always result in the lifter walking about with perpetually bent elbows. Athletes who follow an intelligent plan of strength development cannot become muscle bound.

As for speed: An illustration would point out what I mean here. The weight of a sixteen pound shot provides enough resistance for the great majority of collegiate shot-putters to slow down the muscle contraction involved in putting. After training with weights and achieving greater strength, the athlete finds that the additional strength allows him to overcome the weight resistance more quickly and therefore make a quicker contraction. The momentum of the shot as it leaves the hand is therefore increased with resulting greater distance. The additional strength has made the athlete faster.

There are few here today that will disagree as to the value of the use of weights for weight throwers. It is logical to me that it is right to use a similar program for the pole vaulters, the high and broad jumpers and <u>all</u> the runners. Each one's program would have to be adapted to meet each individual's needs. The muscle groups directly affected in a particular event would receive particular emphasis. For example: the pole vaulters might concentrate on the arm, shoulder and abdominal muscles; the high jumpers on their legs; the runners on their arms, chest and legs. There is little or no difference to my way of thinking whether an athlete overcomes resistance in pushing a 16 pound shot or overcomes resistance in pushing 175 pounds over a crossbar set at a predetermined height. The physiological principle is the same. Sprinting is a confessed strength event.

There are a few basic cautions to follow in setting up a program of weight training. It is necessary to provide the proper place to train. There should be more than one set of barbells in order to avoid a waste of time in adjusting the weight. Several barbells can be set up at different weights to facilitate the training program for a group of men with different capacities.

From the points of view of safety, encouragement and aid, I would insist that there be at least two men working out together. Practice should be conducted on alternate days. If the workout periods follow too closely together the muscle groups will not have a chance to rebuild and soreness may develop. Each exercise should be repeated a minimum of three times to a maximum of seven times. When the exercise can be done seven times the resistance should be increased. As hinted at earlier, the more an exercise is repeated the greater the endurance that is developed. The less repetition with a heavier weight, the more strength is achieved. The term "set" is used to indicate a prescribed number of repetitions of an exercise. Pre-season and early season work with the weights should include 2-3 sets. During the middle and latter stages of the season one set is sufficient to maintain strength.

Lifting should be done with quickness in mind, the movements should be quick.

Be careful. On all standing lifts the feet should be about shoulder width apart. Use the legs to lift the weight off the floor. Grasp the bar about shoulder width except where the type of exercise indicates otherwise.

Always warm up before heavy lifting by doing a few repetitions with a lighter weight.

The athlete should be cautioned against showing off. Engaging in contests of strength may be interesting but can also be dangerous.

Three basic exercises that I would recommend for all athletes to follow are (1) clean and press (2) squats and (3) sit-ups. In the clean and press the barbell is lifted from the floor to the chest in one rapid motion. The bar is then pressed overhead. This action is to be repeated until the prescribed number is reached and then the bar is lowered to the floor. In the squat, the barbell is lifted, many times with the aid of others, to a position resting behind the neck. The athlete then does a deep knee bend and returns to a standing position. This is repeated. The sit-up is just what the name implies. A barbell plate is held behind the neck while the athlete sits up from a resting position on his back.

There are many other exercises that can be used that are particular to one event more so than others. A good principle to follow is that the movement with the weights should exercise the muscle as closely as possible to the actual muscular action of the event. Exercises can be made up to suit the situation since the barbells and dumbbells are adjustable.

A number of years ago I made a number of predictions regarding field event world's records. Some of them have come to pass. In every case where the world record was broken, that person at one time or another, in one form or another, used weight training as part of his training program.

May I thank you all for your kind attention and for allowing me to come here to talk with you today.

"TRAINING A CHAMPION HURDLER"

-- John Marzucco
Lower Merion High School
Pennsylvania

On May 17, 1957, George Hearn, Lower Merion High School hurdler won the 120 High Hurdle Event at our District Meet...Time 13.9 seconds. Very conservatively the loud speaker announced that the previous meet record was broken by this performance. A long silence followed as the starter and referee Mr. Charlie Roeser checked carefully with the judges, timers and recorded the conditions of the track, so that all proper procedure would be under way to present George with a new title, "National Scholastic High Hurdle Champion." Every condition was in order and George Hearn the National Indoor Champion had broken through the 14 second barrier and smashed a 14 year old record, held jointly by three western athletes.

It is difficult to describe the intensity and emotional enthusiasm which sweeps through a coach at a time when his athlete breaks a National record. Now that I have had time to reflect my three years coaching experience with the new National Scholastic record holder, is a story of new techniques and of new training approaches to the high hurdle event. It is very gratifying to me that the new National mark of 13.9 stands today, representing the accomplishment of all we set out to do. What we did may be valuable to coaches for further improvement in hurdling performance.

I have been intensively interested in hurdling despite the fact that I was trapped by a tumble type T hurdle during the Penn State-Syracuse Meet. This mishap caused Penn State to lose its first dual track meet in five years. In 1939, my interest was renewed when I gave up engineering for a coaching and teaching career. Naturally, my first objective was to change the structure of the hurdle, so that spills would be a thing of the past. By the simple elimination of fear and still using the conventional theories in hurdling, we produced a series of District and State Champions at Lower Merion High School. In 1951, I wrote an article for Scholastic Coach titled "Hurdling Progress." In it I said, "by eliminating fear we should have further progress in hurdling performance. With refinement in form and with bigger and faster athletes coming along, we can look forward to the 13 second flat timing. The athlete who does it may well combine the virtues of Dick Attlesey and Harrison Dillard."

A high school coach can do much to start such a hurdler on to world fame. For the past few years, I have searched high and low for a "Mel Patton." A hurdler loose of hip with the proper mental attitude. In 1955, George Hearn first reported for practice and I stopped looking. The potentialities of this boy were so great that I had to reevaluate and up-date my coaching techniques. The challenge was so great that merely up-dating techniques was not enough. We embarked on a period of experimentation, new training approaches and a new track schedule to fit our program.

I must confess at this point that we embarked on this three year experimentation period, not for one boy but for four potential National school boy champions, who were to form the nucleus of my 1955, 1956, and 1957 championship teams. A very strong bond welded these boys together. They were dedicated from the very start to accomplish individual goals and as a relay team to break the National Mile Record. We had four objectives: The National Indoor Track Championship; the National Scholastic Mile Relay Championship; the American Championship at the Penn Relay; and the National High Hurdle Record. Like most ambitious plans, somewhere along the line they break down. We missed #1 by the margin of one point; #2 was sacrificed for #4; #3 and #4 were accomplished.

As a coach, I realized that such an ambitious program required an extensive indoor track campaign. We engaged in three indoor meets in 1955 and in 1956. In 1957 we stepped it up to five meets. Without the generosity of Villanova and James Elliot in giving us the opportunity of using their board track, our plans would have fallen flat.

Equipped with certain basic truths and assumptions, our experimentation to break through conventional hurdling techniques was based in the formulated theory "as obstacles are overcome with decreasing amount of effort, performance will improve." In hurdling, the two areas that lend themselves to investigation and application of this principle (1) the start; (2) the hurdle flight.

After a series of tests conducted on the boards of Villanova College, we discovered a "push and pull technique" by which the starter was catapulated forward .1 second faster for the first ten yards. This new technique based on Newton's third law of motion "that for every action there is an equal reaction", consistently illustrated that in starting, the harder the thrust on the front block, the greater the reaction. Starting blocks were arranged in almost direct alignment with center of gravity of the sprinter and designed to return the thrust in direct alignment of flight. This technique was written up in Scholastic Coach, "The Start of Your Life."

With this phase of the experimentation cleared away, we tackled the second phase: how to cut down flight distance and flight time. We know that a sprinter can make faster time when he is in direct contact with the track. The Charlie Paddock leaps as he approached the finish of the 100 proves this point...it was an experimental failure. How could we bring the hurdler down to earth quicker and subsequently have more sprinting distance?

Digging into record books and talking to Dick Attlesey and Harrison Dillard, I discovered extremes in physical characteristics, sprinting abilities, and hurdling techniques. Analysis of these champions gave me the necessary data for experimentation. Dick Attlesey, former world record holder at 13.5 for 120 High Hurdles is 6' 3½", 200 lbs. He runs 100 in 10 seconds. He uses a hurdle leap of 11'6", with a clearance time of .17 seconds. Harrison Dillard, Olympic Champion and the most exciting hurdler of his time, is 5' 10", 154 lbs. He runs 100 in 9.4 seconds. He uses a hurdle leap of 13', with clearance time of .23 seconds. incidentally, he cleared each hurdle with at least 2" of daylight. He still remembered the Olympic trials of 1948 and the vicious fall he took.

As to form, Dick Attlesey does not touch his heel to the ground on take-off. He takes off with his lead leg and opposite arm extended fairly straight. When his lead leg is 12" from the hurdle, a vigorous cut down is started which straightens his body into the running position. His lead leg is snapped downward. Harrison Dillard touches his heel to the ground on take-off. His lead leg is slightly bent in a relaxed position. He prefers to snap his trail leg earlier which brings his lead leg down fast. The achieved perfection of these outstanding hurdlers, presented the hurdle flight as an unnatural dive which was foreign to the continuity of the sprinting form between the hurdles.

Why should a hurdler take ten dives, instead of ten relaxed elongated sprinting strides (short span flight)? We did not start to experiment to shorten flight span until George Hearn's Junior year--after he had developed hurdle rhythm and was consistently timed under 15 seconds. In order to bring George's flight performance and flat sprinting in closer alignment, the following points were concentrated upon and closely watched.

THE START.

The push and pull technique so that the first 10 yards were covered in 1 3/5. The first step catapulted forward beyond 18" from the starting line. This enabled George to take seven steps and be well within seven foot hurdling range to the first hurdle. At point of take-off George reached 7/8 speed.

HURDLE APPROACH.

On the take-off the heel touches the gound for a more relaxed spring in raising the center of gravity of the body, some three inches, for minimum flight clearance. This action may be simulated to the action of a flat stone skipping over the surface of a pond.

At the same time that the take-off leg changes the horizontal flight of the hurdler the lead leg swings up high, as in an exaggerated sprinting stride, striking the descending chest. The lead leg at this point is bent at 120 degrees, not the conventional 150 degrees. The hurdler's head is almost touching the knee of the lead leg, with eyes focused on the hurdle bar, and with neck muscles perfectly relaxed. The arm opposite the lead leg is not extended parallel to that leg, but is thrown across the body. The knee of the lead leg, head and hand are in the same vertical plane. This action takes the muscular strain out of the hurdle flight span. It removes the time consuming pause that was supposed to refresh.

HURDLE FLIGHT.

As the forward momentum propells the raised center of gravity of the hurdler towards the hurdle, a vigorous cut down is started 18 inches from the bar. As the center of gravity passes the hurdle bar, the lead leg is thrust backward. This action does two things. It shortens the flight span. It places the hurdler in a more direct sprinting position.

The lead leg on ground contact has 20% more power at the beginning of the sprinting thrust. In short, the lead leg describes a short semi-circular path rather than the conventional ellipse. This flight action made possible a reduction of 2' in George Hearn's flight span. George was on the ground for a total of 20 more feet. In addition to the above advantages the flat foot take-off reduces foot strain in the conventional toe-up action. There is the removal of hesitation of the body in flight. The hurdle form is one continuous motion which is closely related to the sprinting action. The center of gravity of the body does not ride parallel to the ground beyond the cross bar but descends quickly to normal sprinting position as this point is reached.

Actually in creating the new short span flight, George Hearn first developed a care-free mental attitude in hurdle clearance. This was attained by setting a flight of hurdles and taking five steps between hurdles at 3/4 speed. The hurdle bar was struck at 42" with 130 degree bent lead leg. Repetition eliminated fear of spilling and developed a natural free hurdle action.

In the final weeks, prior to his record breaking performance, George started his practice with ½ mile jog on the grass. Warm-up exercise consisted of splits. His hurdling was confined to the grass. Going through five or six flights, taking as many as seven steps between hurdles to master the short flight technique. These practice flights were taken back to back with short five minute rest intervals and timed under 16 seconds. The push and pull starting technique was practiced and timed to the first hurdle on alternate days.

George Hearn's three years of hard work and patience with his coach's radical ideas, may be summed up by "Whatever you say, Coach." This fine cooperative attitude finally paid off with a new National Record of 13.9. A final analysis of this experiment can be evaluated by analyzing the 13.9 mark which was created by a 10.3 sprinter, who could only cover a flat 120 yards in 12.2. This means that George Hearn's total flight time was only 1.7 or .17 per hurdle flight. This matches Dick Attlesey's flight time which is considered and accepted as the fastest on record. The 13 flat race is now possible. George Hearn will pick up speed and further refine the short flight technique. This year we will see George Hearn, a Freshman at North Carolina compete with Elias Gilbert for the Nation's top hurdling honors.

POLE VAULTING

-- Richard "Boo" Morcom
University of Pennsylvania

Today the newspapers carried a report that a human being has been catapulted 186 miles above the earth. Despite this possibility, I believe that mankind will still view with excitement the sight of an athlete soaring majestically into the air, hanging momentarily over the cross bar, and then plunging into the pit below. The interesting fact is that because of the apparent danger the crowd feels impelled to watch the novice at the low heights as well as the high-flying champion until each is safely into the pit. There is always the feeling that the vaulter may be at any instant impaled on a broken pole or be thrown twisting through the air to land on his head accompanied by the sound of cracking vertebrae. But at its best the vault is a soul-satisfying thing to watch from the comfort of a seat somewhere in the stands. Especially if you have the full knowledge that you have instructed the vaulter and that his athletic success as well as his physical well being depends to a great extent upon the wisdom of your instruction.

DESIRABLE QUALITIES

1. SPEED
2. STRENGTH
3. COORDINATION
4. BALANCE
5. SPRING
6. AIR-MINDEDNESS
7. Timing
8. DESIRE

These are only a few of the many desirable attributes of a successful pole-vaulter and are not necessarily listed in order of importance. I would like to discuss each for a few minutes with emphasis on methods of improving these particular qualities.

SPEED

The dream vaulter may well be a 9.0 flat sprinter and it has been shown that speed of run is one of the chief factors in successful pole-vaulting. It must be considered, however, that a man carrying a vaulting pole will not be able to achieve speeds near the sprinter running with arms free. Another consideration is the fact that the vaulter must take off on an exact mark which necessitates a measured stride and a rhythm which tends to curtail raw speed. The important consideration is that the vaulter moves down the runway so as to reach a maximum speed two or three strides from the take-off. Vaulting speed may be increased by the following methods:

1. Working with sprinters at the end of the vaulting session.
2. Perfecting a pole carry that facilitates a smooth, relaxed run.
3. Careful attention to measurements of the runway to insure a consistency in strides and a confidence in hitting the proper take-off point.
4. Use of enough runway to insure an adequate time to reach maximum speed.
5. High knee action. This is a big aid in maintaining speed at the take-off by driving with power into the last few strides.

STRENGTH

We have long known that the vaulter should be strong and have advocated rope climbing and other gymnastic apparatus to meet this need. Now with weight-lifting coming into general use, coaches will have to know more and more about the exercises and techniques involved in order that the vaulter may be instructed in the various exercises that will be beneficial. Nearly all lifts and presses used in weight training would be beneficial but emphasis should be placed on those using the arms, shoulders, and stomach. Weight lifting should be done when the weather is bad and some form of physical strengthening should end every work-out.

COORDINATION

It is without question that pole-vaulting is an extremely complex event requiring a high degree of muscular coordination. General coordination is probably born with the man but we all know of instances where an awkward boy has through constant practice become quite efficient at a task requiring above-average coordination. Through constant practice of the particular skill of pole-vaulting, some pole-vaulters may be considered quite coordinated; however, off the runway they may still continue to trip going upstairs or fail in athletic events in which their experience is limited. The best exercise for developing coordination for pole-vaulting is, of course, making the actual

Bob Gutowski
(Occidental College)

vault. The athlete should vault as many days a year as possible. The vaults each day should be limited to a number which allows the vaulter to jump without strain. The fatigued vaulter loses coordination and begins to make serious mistakes. Repetition of such mistakes tends to "perfect" them until they are a part of the vault.

BALANCE

Balance in regard to pole-vaulting means that the athlete has managed to take his center of gravity down the runway and over the bar without deviating laterally. The pole should be straight at the top of the vault and fall back directly towards the runway. A coach observing his pupil from the end of the runway should note the following: the straightness of the run, the take-off directly in line with the pole, the rise of the lead leg up over the center of the bar; the vaulter falling in the center of the pit and the direction of the falling pole. A difficult task is to get the vaulter to jump directly in line with the pole. When this is mastered it will add greatly to perfecting the vault.

SPRING

Some vaulters claim to spring and others to run off of the ground at the take-off. The advantage of the spring is that the vaulter may hold higher on the pole. The direction of spring is similar to that of the broad jumper in that it is a step upward while the momentum continues forward. The last stride before the take-off should not be lengthened since that tends to slow the desirable forward momentum. The take-off foot should be planted firmly and the opposite leg should have a high knee lift. The most efficient spring comes when the center of the take-off foot is directly under the arms extended. The use of weight-lifting training will probably help to increase spring used in vaulting.

AIR MINDEDNESS

Most people prefer keeping both feet on the ground and it seems to be a special breed of people that will fly 14 or 15 feet up into the air supported by a slender metal tube which sometimes bends s sickeningly and threatens to snap at a crucial moment. The ability of young men to overcome the instinct for self-preservation is probably the most outstanding factor in making the pole vault the spectacular event that it has been for so many years. It requires confidence in the vaulting pole and the safety of the pit to allow a man to concentrate on the intricate task of the vault itself. This confidence will be increased by frequent checking of the vaulting pole for cracks, dents and signs of weakness. Pits should be made of sawdust or shavings piled above the ground and surrounded by bags of sawdust.

TIMING

Perhaps the most mysterious phase of the vault is the timing necessary to make a vault at heights over twelve feet. At heights above twelve feet it is necessary to make a break in the physical effort of the vault. The only strength required is to hang on to the pole and to ride it until it is nearly perpendicular. During this ride centrifugal force plus tightening of stomach muscles brings the body into the so-called basket. It is at the moment when the pole has lost nearly all of its upward momentum that the explosion of the pull-push and release occurs.

The fact that this event is really two explosive actions separated by a period of low power output makes it similar to a two stage rocket. It is the mastering of this technique of the delayed pull which makes pole-vaulting a trick. To practice the delayed pull, the vaulter should place the bar twelve yards or more behind the take-off box. He must then ride the pole until it is perpendicular before pulling. The pull should be made with as much power as possible.

DESIRE

One of the greatest assets a vaulter can possess is desire. If he is the boy that always wants one more try in practice, you'd better give him attention, especially if he is young. Cultivate interest with good equipment and facilities. Vaulters need a lot of encouragement because it's pretty discouraging to sprint 40 years with a pole, make a tremendous physical effort only to knock the bar off with an elbow. Once desire has been established you can never tell where the vaulter will end. The sky is the limit.

SPRINTING

-- Leo Johnson
University of Illinois

In prefacing my remarks on the subject of sprinting, I should like you to bear in mind that what I shall say is based on my experiences and observations of my own men over a period of some 34 years and more particularly the past 20 years. I owe much to the confidence and enthusiasm with which these men have accepted whatever methods of approach I have deemed advisable and I also owe a great deal to the experiences of the coaches who have preceded me and to those with whom I am now associated in the field.

As I observe the fine performances of many athletes throughout the country, in the high schools and in our colleges and universities, I have a feeling unfortunately too often unexpressed, of appreciation for all that lies back of these performances - your guidance as coaches in the preparation of these athletes and your supply of the inspiration needed in great achievement, both at the physiological and the psychological levels.

Basically, sprinting is moving at top speed between two given points. The time required to cover the distance will depend on two general considerations: first, upon the physical qualifications of the subject, which embraces health, muscular strength, force, drive, coordination, efficiency and smoothness of operation; second, the psychological approach to the task, which embodies not only confidence in ability, but also a confidence which stems from the assurance that the subject, through proper background of conditioning, is able to call upon and receive full expression of his native ability. Certainly any lack of confidence will result in a controlled effort and restricted performance. I most certainly feel that lack of either the physical or mental requirements, or both, will neither be stimulating nor inspiring to the height of achievement sought.

Since we search for that one who can travel these distances in the shortest elapsed time, let us consider my first premise, that of health, muscular strength, force, drive, coordination and efficiency of operation. You will note that no reference has been made to type. We have all experienced outstanding ability in statures of 5'4" to 6'3" and varying weights commensurate with body structure. Don't forget that weight will slow a freight train. Buddy Young, my first good sprinter, was 5'4" and carried 150 lbs. He later came back to the campus after two seasons of football, college and service, for a period of three weeks in preparation for the sprint series in the Chicago Daily News Relays. His weight was 185 pounds. Through a heavy schedule of two-a-day workouts, he managed to get down to 173 lbs. His reactions and reflexes were sharp but the weight added .2 seconds to his 60 yard time of 6.1 in 1944. McKenley, 6'1" ran at 153 lbs; Mathis, 5'4" at 135; Billy Williams, 5'9" carried about 156; Mitchell, a halfback on our football team ran 9.7 and carried 183 lbs. Certainly there is an optimum weight for each.

Let us pass health, muscular strength, force and drive as being fundamental and self-understood. In speaking of coordination, I refer to smoothness in operation. Efficiency in operation starts at the blocks, continues through the so-called transitional zone, the full stride and the finish. Since I shall in all probability deal at greater length with the start, let us consider the race in reverse order. First, the finish. Here is a point that a sprinter should anticipate with confidence growing out of the knowledge and assurance that he is prepared, well conditioned, strong, with endurance for an all-out effort throughout the course. This, you realize, is true of all distances including 100 yards and 100 meters. To clarify this point, I shall refer to an experience with one of my own sprinters in the indoor and outdoor seasons of 1944. This was a year in the Western Conference in which freshmen were eligible for our varsity teams. Buddy Young graduated from high school in mid-year, January 1944, and enrolled in the university in the second semester. He had been an outstanding sprinter in high school in the 60 and 100. He showed particular confidence in and preference for the indoor sprint distances. An experience in an AAU meet in the summer of '43 while he was still in high school, when he was beaten by some of the best sprinters in the country, left him in doubt about his ability to run the 100 in college. The 220 was beyond his reach; he had even avoided it in high school. In preparation for the sprint series in the Milrose Games in February of 44, I started his work with easy 440's and 300's, the 440's at a pace that he could get home without any undue discomfiture. The surprising thing was that he really took to the 300's and loved to run them for time. On our track he worked 31.1.

Before leaving for New York, I suggested to him that it seemed rather silly to take an additional man for our mile relay team, when the most he would probably do would be to run only two races of 60 yards or so, totaling a little over twelve seconds. This wouldn't be much of a workout, so why not run with our mile relay team later in the evening? He would lead off and try to hold our deficit as low as possible. He agreed. The result was that he not only won the 60 in 6.1 but he gave us a

50 flat leg in the mile relay. He continued as a member of that team throughout the rest of the indoor-outdoor season. In the spring, as we stood at the head of our straightaway in the stadium and looked toward the finish of the 220, he remarked to me, "That isn't far, is it?" He ran the 220 that year in 20.6. He anticipated the finish with confidence.

I am convinced that in the longer sprints, if a sprinter has no reservations on the fact that in an all-out effort he can arrive at the finish in good shape and without any undue distress or discomfort, the results will be gratifying and I am just as convinced that if there exists the least doubt, the results will not be good. If there was any one factor - other than his God-given ability to run fast and sprint - that was responsible for McKenley's world record in the 440, it was his background of preparation and more important still, the genuine confidence that this preparation gave him that he could go the full route in an all-out effort. There was no doubt, no reservation.

As far as the finish itself is concerned, my only emphasis is that they run beyond it, not anticipating the arrival with a resulting letting down or slacking off. Through the course and at full sprinting stride, the body lean should be slightly forward, the sprinter completely relaxed, arms swinging naturally, forearms carried slightly below the horizontal, hands open, not clenched. The hands on the upward swing should reach chest high but not past the center of the body and the hands on the backward swing just to the rear of the hips. The knee lift, reach and touch must be stressed; attention should be directed to this or to your concept of the proper technique in sprinting only through the first three days of the week and repeated in this cycle until the desired results are attained. I hold it to be undesirable to make a sprinter - or in fact any performer - technique-conscious at the time of competition. I have advised my men in this situation to forget all that we have stressed, just to get the job done, in the hope that by constant repetition it would ultimately become automatic and a part of his pattern.

There may occur a period in the race, perhaps about the 30 yard mark in the 100, where a sprinter in a tight race tries too hard, loses his smoothness, flays his arms and tries something beyond his reach in order to move faster, the only result being a definite tenseness, an inhibition of movement with resultant slowing down. This occurred one year in the case of Billy Mathis, a fine sprinter, always off to a good start and an early lead. But as the field closed in on him, he quite unnecessarily tried too hard and literally "broke". It was only after I had stationed myself before the race at a point approximately 75 yards down the track and called to him as he approached that I was able to help him to keep relaxed and run it out. It was only when he held form and was completely relaxed that he enjoyed his best races.

This is not to be interpreted as opposing the ability to turn it on at any point in the race. Rather, I really think the ability to turn it on or off is characteristic of great sprinters. However, this is a quality that is "acquired" in spite of the fact that it is undoubtedly native, acquired in the sense that it may take experience to discover it. Billy Williams was a 9.7-9.8 sprinter through his sophomore year and it was not until his junior year that he ran 9.5. Perhaps maturity, improved muscular strength and racing experience played a part but I do know that up until one afternoon in April he was a 9.7-9.8 sprinter. On that afternoon, thrown against the best sprinters of the Southwest (some boasting 9.5 and 9.6 records), he found something at the 75 yard mark in the finals of the 100 that he never knew he possessed, a burst of speed which carried him well into the lead and about 40 yards beyond the finish. That discovery was the difference in one day between a 9.7 and 9.5 sprinter.

And now we get down to the one phase of sprinting where I spend much of my time, a phase which involves careful thought and consideration, the start, and in this connection I shall speak briefly of the transitional zone. A good start doesn't necessarily mean a good race; much lies beyond the starting line, but let us say it is conducive to a good race. Superior sprinters may recover from a bad start and still win but with an even field there can be no mistakes at the start.

I concern myself with seeing to it that good blocks are available, guaranteed against slipping, securely anchored and with proper angle-facing. The important thing to me is the placement of the blocks from the starting line, a spacing that assures me that the sprinter is placed in the optimum set position for his best start.

Although I am aware of three starting positions, namely (1) the medium, (2) the bunch - and here I find wide differences of opinion in definition, whether the toe of the rear foot is opposite the heel of the forward foot or the toe of the rear foot 10 inches back of the front foot, instep, toe, heel, - quite a difference - and (3) the elongated, where the knee of the rear leg is opposite the heel of the front foot. If anyone can recommend a use for this last starting position, I would like to know where. In all my experience I have found no occasion for its use and little need of mentioning it. I must also say that I have found trouble with the so-called "medium" starting position,

hips too low, knees bent at too great an angle at the "get set" for effective drive.

Likewise, I have experienced difficulty with the "bunch" starting position, if I am to assume that this means the feet are closer than ten inches toe to heel. The hips are too high, the legs too straight. What then, should be the spacing of the blocks so as to give the desired angles at the "set" position of both front and rear legs, so that I find no subconscious change of those angles necessary for effective drive after the signal and before action or response occurs? I have found that a position of the blocks that lies between the "medium" and the "bunch" - as I define them - has given me my most effective start.

I place the front block approximately 14 inches behind the starting line. Having placed the front foot in this block, I now place the rear break of the knee of the rear leg opposite this block. I then slide the rear block into position against the rear foot and anchor it. These are now my initial starting points. I adjust both blocks slightly if the proper angles formed by the legs at the "set" position are not approximately 90 degrees for the front leg and 105 to 120 degrees for the rear leg, the angle of the rear leg depending on the height of the sprinter. Just as no broad jumper can possibly drive from a fully flexed knee (which a "medium" starting position will approximate), so will he be unable to jump from a straight leg, the position which a "bunch" start may force him to assume. Therefore that must be the angle from which the sprinter will experience the most powerful and effective thrust. I have found that this last defined position gives me most consistently the angles I desire.

And now to the position of the body on taking the mark. Place the feet firmly against the blocks, rear knee on the track, arms straight, elbows locked. Place the hands, fingers and thumbs extended, fingers joined, thumb and first two fingers immediately behind and parallel to the starting line directly below the shoulders. I ask that the thumbs be not over six inches apart, assuring the highest elevation of the shoulders. This may mean interference of the arms and knees with the rear leg but I prefer canting the knee inward rather than widening the space between the hands. In any case, any interference disappears when the "set" position is assumed. Head and eyes faced down the track. At the "set" position the hips are raised above the shoulder line and the body weight inclined forward. I do not want all the weight on the hands, nor do I want all the weight over the blocks. Inclination of the arms should be forward rather than backward. The eyes are now turned to a point just in front of the starting line. This I have found to be the best position from which to initiate the start.

But this is just part of the problem. We come to the response to the starting signal. Here reflexes and reactions enter. Most certainly the reaction to the impulse can be improved by repetition and made razor-sharp only if the sprinter is at complete attention and deeply concentrated toward the impulse. It is my opinion that much of our poor reaction or poor starting time is primarily due to the failure to concentrate and the inability to shut out all distractions at the start. Training in assuming an attitude of complete attention and concentration will definitely improve the starting time. Some sprinters have found it an aid to starting to close their eyes at the "Get Set". Actually, I believe that a good many sprinters are really not aware of their lack of mental preparedness.

Not long ago I was shown an instrument which measured the elapsed time of the sprinter between the starting signal and any point 5, 10, 15, 20 yards down the track. The starting signal was a buzz which occurred at a predetermined and set interval of time after the sprinter got set. The real value of such an instrument, in my opinion, lay in the fact that it called for complete concentration on the starting signal and I could see where repeated work with this instrument could and would improve starting time.

I have thought of the start as the release of a tightly compressed spring, the action explosive and forceful, forward and upward. The arms immediately spring into action. The starting stride will be short and then lengthen into the full stride at top speed. To say that this transitional zone should require a certain distance, say 10 or 15 yards, I believe to be wrong. I instruct my sprinters to get into the full running stride as soon as they can without sacrificing body angle.

I have never concerned my sprinters about a proper breathing pattern either at the start or in the course run. I am sure that all sprinters at the set position inhale and hold, just as a good marksman does as he aligns the sights before squeezing the trigger. As far as the course is concerned, if the sprinter arrives at the finish erect and in good condition, the chances are pretty good that there is nothing wrong with his breathing pattern.

I would like to speak briefly about conditioning - not in detail, because all of you have your opinions on the subject. We may differ in our approach and travel many different routes but we all arrive pretty close together at the end of the journey. As individual needs differ, so must our methods differ. As for me, my preseason and early season conditioning programs are by necessity the heaviest, tempered by the ability of the individual to carry work and always designed not to discourage. This includes work off the track, on the turf during the fall. My objectives are respiratory adjustment, muscular strengthening and attempting to acquire smoothness and economy of action. There is no fast work, simply relaxed striding. In the first stages we set no time requirements, simply alternate running and walking. The second stage embraces 220's, 330's, 440's at a mile pace, lowering these times as we approach our indoor work - usually four to five weeks before our first competition. Once in competition, only enough work to keep sharp and stay sharp. A highly trained sprinter is much like a stringed instrument, carefully tuned. Just enough work, then, to keep in tune. If in tune, don't tighten, if loose, tighten them up. Here the judgement of the coach is important.

The warmup and the methods used, I consider to be of great importance. Here again the length and type of warmup will differ with the individual. I have observed among my own runners - and I am speaking of all my runners - that the length of the warmup may vary as widely as 30 minutes. During my first year in the Western Conference I had the experience of finding one of my men, in this case a miler, definitely set on the idea of a full hour warmup and yet others used as little as twenty minutes as was the case with Bob Kelly, the conference 440 and 880 champion. Certainly the warmup should be long enough for the breathing to become easy, not forced, muscles completely loose and relaxed, body temperature up with a break into perspiration. I think it important that the sprinter should, in the latter stages of his warmup, approach his top racing speed at short distances, carefully building up to this speed, carefully letting off. This is just as sensible to me as a pitcher who never starts throwing his fast ball without first building up to that type of delivery in his warmup.

The procedure of my warmup is (1) easy jogging and loosening of all muscles, (2) calisthenics, (3) back to easy running and working toward the speed expected to be carried in the race. This precedes all workouts as well as competitive meets. I use our practice sessions to help each individual to determine for himself what shall be the length and type of warmup from which he can expect his best performance. He may have found out during his workouts that the warmup had been too short - very seldom too long. What a relief to the coach when the boy arrives at the locker room one full hour (and this is mandatory with me) before his race, giving him time to dress leisurely, with ample time for careful preparation for his race. On the other hand, how frustrating, not only to the coach but to the athlete as well, to arrive late, hurry here, hurry there, rushing through the warmup with no time to become relaxed and mentally prepared for the test. And beware of the time between heats and races. There should be adequate warming up and loosening up before every effort. In 1938 I lost one of the best 220 men in the Western Conference in an early May dual meet. Following the 100, which he won in 9.7, he went into the stadium seats to visit his mother and father, who were attending the meet. He was alerted for the 220 only when the runners were being called to the start. The 220 was his best race but he went to the marks too soon and pulled up lame in the first 50 yards of the race.

In conclusion, let me acknowledge to you that there are many and varied methods and approaches to the one goal we all seek, the attainment of championship performances. As your experiences differ from mine, so by necessity will your approaches and methods in building healthy bodies, strong muscles, wholesome attitudes and efficient techniques. I assure you that I have nothing but the deepest appreciation of the many fine accomplishments you have experienced with your athletes. I can say this honestly because I have learned so much from them. So in closing I will only say that I consider myself very fortunate both in having had good athletes and in fine associations with my colleagues.

Don Stewart 6'10" Jumper

By J. McADOO KEATON
Track Coach, Southern Methodist University

1

DON STEWART is in his junior year at Southern Methodist University. He is 6 feet, 3½ inches tall and weighs 180 pounds. Last year, as a sophomore, Don jumped 6 feet, 7½ inches or better in eight meets. His best jump, 6 feet, 10⅞ inches, set a new Southwest Conference record.

In high school and in his freshman year at SMU, Don participated in football, basketball, and track. In his senior year in high school, he tied for first place at the state meet with a jump of 6 feet, 2 inches. When he entered SMU, he was considered a better prospect in the high hurdles and the broad jump than in the high jump. However, the first meet proved otherwise when he did 6 feet, 8 inches in the high jump.

Don played football during his sophomore year but received an injury to the knee of his take-off leg, and last fall he decided to give up football. Last fall we planned to do considerable work on technique, but an injury to Don's back limited his work to running. He has now completely recovered, and for the past two weeks has been working on jumping.

We still have a great deal of work to do on Don's technique and his work schedule. In his freshman year he started late because he was in spring football. Last spring we had rain in Texas, for a change, and he did not have the opportunity to do much work except in the meets.

Stewart plans to stay in school an extra year to do advanced work, and we predict that 1959, his senior year, and 1960 will be his best years.

If the weather permits, on Monday and Wednesday Don plans to work on technique and some jumping and finish with running. Tuesday will be his hardest work day on jumping, provided the meet is scheduled for Saturday. He will not do very much on Thursday and Friday.

The accompanying pictures were taken at the Drake Relays last year. Because of rain, Don did not work

5 6 7

2 3 4

any the week of the meet, and as the take-off was soft, he was off his technique and had a bad day. The bar was at 6 feet, 4 inches, and Illustration 6 indicates that he cleared it by 6 inches.

On the approach, Don tries to be as relaxed as possible at the take-off. He uses a fairly slow approach and last year came in at a 30° angle (we are going to use a wider angle this year in an effort to correct some faults in clearing the bar). He increases his speed and lengthens the last three steps.

Illustration 1 shows Don coming in at about a 30° angle. On his better days, he settles back a little more and his right arm is not so far behind his back.

In Illustration 2, he has planted the take-off foot almost at right angles 18 inches from the bar and has started his lift with bent lead leg and arms.

Illustration 3 shows that Don uses more right arm than most jumpers, and he does have some trouble with too much lean into the bar.

In Illustration 4, we believe Don is much closer to the standard to his left than he would be on a dry take-off, and this might have caused too much dive straight ahead as shown in Illustration 5. If he had shortened his approach, he might have done better.

As shown in Illustration 6, the bar is 6 feet, 4 inches, and it appears as though Don is clearing it by 6 inches.

Illustration 7 shows that Don has started to straighten his trail leg.

In Illustration 8, Don has straightened out his trail leg but is driving straight ahead instead of turning his head and shoulders to the left and rolling his hips.

Illustrations 9 and 10 show that we still have a great deal of work to do on Don's landing. He injured his back in a sand pit the week before the NCAA Meet last spring.

After the Drake Relays, Don did some good work, and at the Southwest Conference Meet, he jumped 6 feet, 10⅞ inches for a new record.

8 9 10

DIET AND TRAINING TIPS FOR ATHLETES

-- Chuck Coker
Occidental College

In the first section of this paper, we are devoting a lot of space to milk which we consider to be an important food for the athlete. The following are some ideas on its use and some additional facts you should know:

Sweet Milk, when taken at meal time, has an alkaline reaction in the stomach and tends to counteract the natural acidity of the hydrochloric acid in our digestive juices. This prevents the protein foods from being properly digested. If you like the flavor of fresh sweet milk and it doesn't lie in your stomach like a handful of putty, continue to enjoy it as an in-between-meal drink because it is definitely needed for proper growth and body repair.

Buttermilk, as a mealtime drink, is entirely different because of its high lactic acid content. It actually promotes and aids in the digestion of proteins and iron-containing foods.

Rich whole sweet milk at mealtime also satisfies the appetite too quickly, taking away the desire for larger quantities of other foods containing richer sources of protein, minerals, and vitamins.

In many people, the undigested fat in too rich milk combines with calcium, thereby preventing this vital mineral from reaching the blood stream. This can result in a serious calcium deficiency, despite the most earnest effort to "drink plenty" of milk for calcium.

If you find rich whole milk "binding", it is because the combination of fat-and-calcium forms a sort of hard soap in the intestines causing a hard-to-overcome type of constipation.

Regardless of whether or not your weight is normal, dry skim is the best for you. So concentrated is dry skim milk that it contains eleven times more high grade protein, minerals, B-vitamins and lactose than fresh whole milk. This means that eleven pounds of fresh milk are used to prepare one pound of dry skim milk.

Powdered skim milk is 36.5 per cent protein, as compared to 19.7 per cent protein found in an equal weight of lean beef. When you use this concentrated milk powder, you are providing your body with a food that is more than one-third pure protein of the type classified as complete by biochemists. All the important minerals necessary for human health are found in dry skim milk.

This lengthy discussion brings us to the point, how do I use it?

1. By fortifying one quart of milk (skim) with a half cup or sixteen tablespoonsful of dry skim milk. This can be done by adding some milk to the dry milk and beat it until dissolved. Then add the remainder of the quart of milk. If the above is impossible, add four tablespoons per glass and stir until dissolved.

This will give you almost double the value of a quart of milk, increase your endurance, and provide you with a long lasting blood sugar level.

One of the best instant dry milks to use in fortifying your milk is Carnation Instant Dry Skim. It mixes easily and has a real fine flavor and convenient pouring spout!

2. Other methods of using instant dry skim in your diet or eating habits are as follows:

Add a tablespoon or two to a glass of tomato juice, to scrambled eggs, soups, sauces, puddings, custards, meat loaf (you can really raise the protein content of a meat loaf by adding a large quantity of dry skim).

3. Energy candy for a long lasting sugar curve is made in the following manner: This recipe is one formulated by Mrs. Gladys Lindberg of Lindberg's Nutrition Service of Los Angeles at 3945 Crenshaw Blvd.

1 can Eagle Brand Milk
2 to 3 cups instant dry skim
Mix the instant dry in, a little at a time, until it is all dissolved.
2 tablespoons of carob powder will give it a chocolate flavor or natural vanilla or maple can be used. To this, add chopped nuts or shredded cocoanut.
Pour ingredients into a greased cookie sheet or flat pan and place in the refrigerator for several hours or overnight. Cut into squares 1½ X 1½ inches.

EAT: 2 to 3 hours before an athletic contest. As a half-time pickup or between the first and second race to be run in a track meet. OR, as a pickup for the housewife or business man.

4. Milk can be used as a pre-game or meet drink with none of the usual binding or nauseating effects if it is skim milk. We use it for our football and track teams and have never had one single case of upset stomach. This does not hold true for whole sweet milk, however.

The following are the protein contents of various types of milk products:

	Food Energy Calories	Grams Protein	Grams Fat
1 Quart Buttermilk	348	34.2	1.0
1 Quart Fresh Whole Milk	666	34.2	38.1
1 Quart Fresh Skim Milk	350	34.4	1.0
1 Cup Dry Skim Milk	434	42.7	1.2
1 Quart Half and Half	1322	31.0	116.2
1 Quart Goats' Milk	654	32.2	39.0
Malted Milk (Dry Powder) 1 OZ.	115	4.1	2.4
Whipped Cream, 4 tbsps.	120	1.0	4.0
Cottage Cheese (From Skim Milk), 1 Cup	215	43.9	1.1
Swiss Cheese, 1 OZ.	105	7.8	7.9

This gives you a brief idea of the milk products and their relative values for selection for your diet.

All meat and animal proteins are good sources of protein. You should eat a minimum of 150 grams of protein each day of which 75% should be animal proteins. The remainder of your daily protein intake may come from vegetable sources.

General Diet and Food Preparation

Strong healthy people possessing limitless energy are built by abundant, well balanced diets. To be well fed means more than filling the stomach with foods that appease the hunger. It means having each day the kind of food that will promote abounding health, energy, vitality, and resistance to illness.

Special emphasis is placed on the preparation of the food for the athlete. His food should be BROILED, BAKED and BOILED. When boiling, use as little water as possible and cook in the quickest time possible.

Special emphasis also is placed on the meal the night before competition and the day of competition.

The following foods are some to be avoided the day before and the day of competition, as well as throughout the season:

1. Greasy or fried foods: pork, pie, biscuits, pancakes, donuts, potato chips, buttered popcorn, salad oil dressing.

2. Gas forming foods: dried beans, onions, cabbage, cauliflower, kraut.

3. Spicy or peppery foods: chili, hot dogs, catsup, mustard, pickles, tamales.

4. White bread, hot bread, rolls, macaroni, noodles, crackers, spaghetti, cake, waffles, hotcakes, dry cereals, cookies, pastry.

5. Tobacco and alcohol.

6. Candy, gum, life savers, mints, all soft drinks (coke, pepsi, etc. are definitely gas forming), real cold or frozen foods.

7. Avoid foods made with refined grains, sugar, and hydrogenated fats (shortenings, margarines, etc.).

Thinking and Emotions

Nutrition is a psychosomatic process so we must accentuate the positive and eliminate the negative. Plenty of rest, a good philosophy of living which will bring you freedom from worry, are essentials to rebuilding a healthy body and the correct assimilation of food.

Individuals differ somewhat in their absorption, use and response to food. The athlete should eat nothing he feels might bother him. There is a psychological as well as a physiological response to food. Therefore, a liking for a truly important food should be developed by starting with a small amount and gradually increasing the amount as time goes by.

The athlete whose training includes special emphasis on diet is sure to develop the sureness which comes from knowing he has considered every detail of training. Diet can be one of the most important factors in an athlete's performance.

THERE IS NO SUBSTITUTE FOR THE LACK OF REST!

YOU HAVE A MENTAL BLOCK BECAUSE YOU DON'T WANT TO HEAR!

ENVY, FEAR, HATE and ANGER can destroy top performance--avoid these emotions for best performance.

Reasons for let-down the second half of play or second race include:

1. Poor breakfast!
2. Too few endurance foods (especially Vitamin C foods).
3. Too little, too heavy, or improper food before competition.
4. Failure to adhere to good nutrition practices throughout the entire season.
5. CAUTION! Don't take sugar or dextrose before competing! This gives you, after a short time, a high blood sugar rise and the body becomes alarmed. Immediately, there is an increased flow of insulin which actually lowers your blood sugar level to below normal. This may result in a sudden feeling of tiredness or fatigue. You can undo a whole week of training in five minutes.

If you eat according to the diet outlined in this paper, you won't need to worry about energy or becoming tired!

A Typical High Protein Energy Producing Diet

Breakfast:

2 to 4 fresh eggs (not cold storage), soft-boiled, scrambled, poached, shirred (not fried). Add a large amount of instant dry milk to scrambled eggs or omelet to increase the protein content. Also 2 tablespoons of soy oil (cold pressed) will help to get the unsaturated fats into the diet.

Potatoes (optional), boiled, baked, hash-brown, au gratin, scalloped (not fried).

Meat, steak, liver, beef, fish, etc.

8 Oz. Orange Juice or the equivalent in fresh oranges or grapefruit or 16 oz. Tomato Juice.

8 Oz. Buttermilk or Skim Milk with 4 Tbsp. Instant Dry added.

Fresh Fruits are also good, such as: oranges, peaches, pears, melons, etc.

Lunch:

Meat, same as breakfast or Fish (eat liver two or three times per week if you can).

Potatoes, same choice as breakfast.

vegetables, one green or yellow.

Salad, vegetable or fruit (not canned).

8 Oz. Fortified Skim Milk with 4 tbsps. Instant Dry.

Cheese, American, Swiss, Jack, or any good solid cheese (no processed cheese).

Fruit, apples, oranges, banana, pears, peaches, cantaloupe, tangerines, etc.

Dinner:

12 Oz. Meat, broiled steak or equal.

Potatoes, same as above.

Vegetables, yellow and green, choice of one or both.

8 to 16 Oz. Fortified Skim Milk with Instant Dry.

Fruit, same as above.

Cheese, same as above.

Custards, made with honey and fortified with dry skim milk.

In every 24 hours, eat at least one pound of meat or salt water fish; drink one quart of skim milk with 16 tablespoonsful of dry skim milk added.

The Following Are a Few Additional Food Tips That Come To Me As This Is Being Written:

Avoid Carbonated Drinks of all kinds. They are gas forming and the sugar content is bad for you as well as being bad for your teeth!

Avoid Chocolate in all forms. It is hard to digest and prevents the absorption of calcium when it is eaten.

Avoid Spinach. It is okay for Popeye but the oxalic acid in spinach prevents the body from absorbing calcium from the foods or milk eaten in conjunction with it.

If Possible, eat liver 2 to 3 times per week or take liver yeast tablets daily - 20 to 30 tablets.

Get 75 to 100 mgms. of pantothenatic acid every day. This will keep your ascorbic acid level in the blood higher. It helps prevent over stressing the adrenal glands. In a low-protein diet which causes additional stress of the adrenals, the pantothenate requirement of the body also increases. Pantothenate is needed by the body to prevent abnormal stress of the adrenal glands. Such stress can definitely be a cause of staleness in mid or late season. When a boy all-of-a-sudden falls way below his average performance, he has pushed himself so hard that his adrenals become dry without proper diet and vitamin protection.

Avoid Laxatives and Mineral Oils. They impair the absorption of a number of nutrients, namely: Carotene or Vitamin A, D, E, and K.

Avoid Antacids or Alkalinizing Agents. They impair the absorption of Vitamin B^1 and Ascorbic Acid. Calcium and Iron are also affected.

The Body Becomes Susceptible To Disease Conditions and the Common Cold when the diet contains the following principal disease-producing foods: white flour, sugar, and canned foods.

When Possible eat organically grown foods: vegetables, cereals, etc.

THE VARSITY PACK PLAN

The vitamins needed by an athlete, in school or otherwise, play an important part in his performance, health, and general well being, as well as his resistance to disease. Our athletes at Oxy take a daily ration of minerals and vitamins which is figured out on a stress formula basis. The results have been amazing: fewer illnesses (colds); no staleness in mid-season; tremendous improvements in all events. Not enough can be said about this exceptional program.

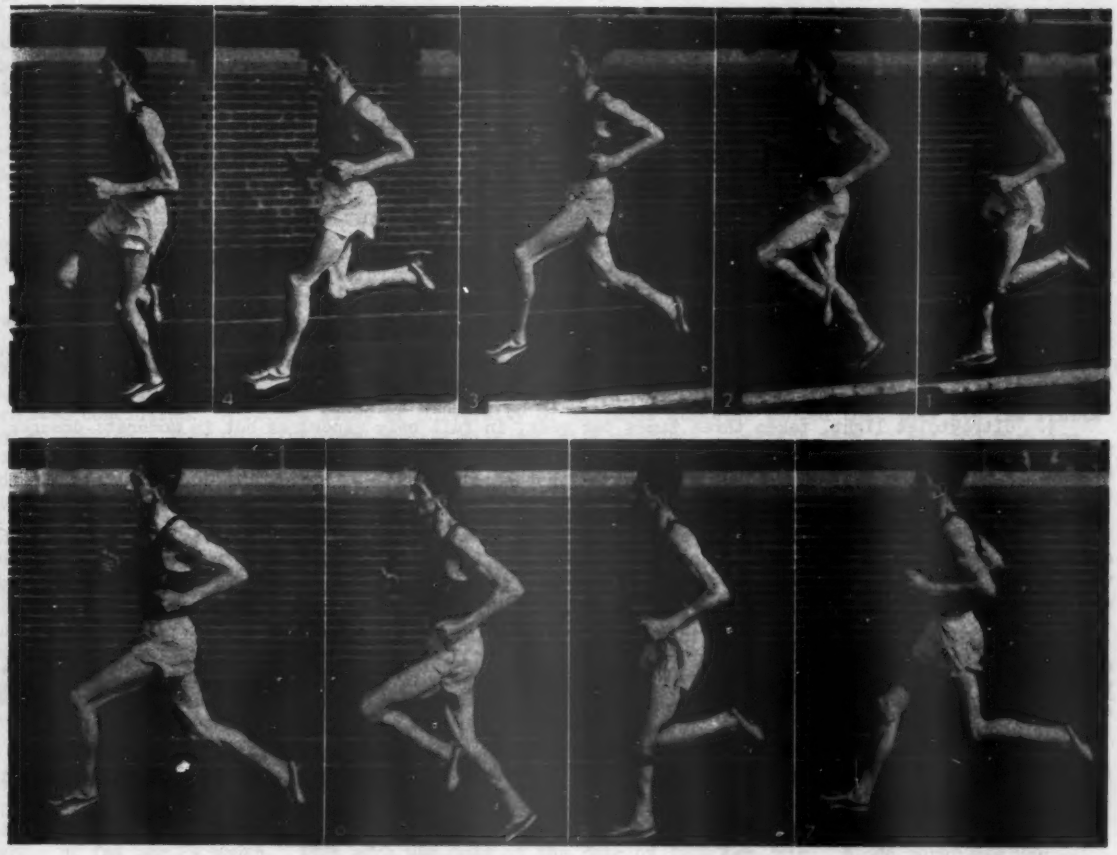
These boys made the following improvements last year and we believe our diet and vitamin-mineral program played an important part in their training:

John Kerr:	9:50.5	Two Mile	to 9:14.0
Dave Reisbord:	4:41.0	Mile	to 4:11.3
Ty Hadley:	4:13.2	Mile	to 4:08.2
Larry Wray:	4:14	Mile	to 4:05.7
Bill Reay:	1:59	880	to 1:52.0
Bob Nini:	49.2	440	to 47.9
Tod White:	4.20	Mile	to 4:08.3
Bob Gutovski:	15½' 22'	Polevault Broad Jump	to 15' 9 3/4" to 24' 4¼"
Jon Jamison:	199' 5"	Javelin	to 219' 6½"
Rudy Alston:	9:8	100 Yd. Dash	to 9:5
Russ Bennett:	10:02	Two Mile	to 9:34.0

Another area which is extremely important for everybody as well as the athlete is getting a sufficient amount of essential fatty acids in the diet, particularly the linoleic and arachidonic fatty acids. Many chronic degenerative diseases result because of essential fatty acid deficiency.

To obtain essential fatty acids, eliminate the following from the diet: margarine, white bread, or products made with white flour. Use cold pressed soy oil in cooking. Add it to scrambled eggs or anything requiring oil in the cooking process.

There are several marketed products now available which provide an easy way to obtain these essential fatty acids. Abbott Laboratories offer "Saff", an emulsion of Safflower oil in water containing linoleic acid. Armour Laboratories have announced "Arcotac", a combination of Safflower oil and pyridoxine (Vitamin B6). Pfizer Laboratories expect to market "Linodoxin", a combination of linoleic acid, nicotinic acid, pyridoxine, and mixed tocopherols. Any of these products will supply the necessary amount of fatty acids.



By Jim Elliott

OLYMPIC CHAMPION

STRIDE STUDY OF RON DELANY

NO. 1: Delany's style is not typical but a most efficient method of covering ground while conserving energy. He runs with a short stride, as do most Europeans. As a result, the body is quite erect and there's practically no bounce—so often seen in our longer-striding athletes.

NO. 2: Left foot has now swung forward and raised knee. Knee hasn't been drawn up, as that requires additional energy—which Delany's trying to conserve. It isn't necessary to drive knee up, since he has no intention of taking a long stride. Note also erect trunk and toes pointing straight ahead.

NO. 3: Delany is now merely letting left foot fall to track, rather than reaching out for additional stride length. Here again there's conservation of energy—as gravity rather than muscular energy is being used to get left foot back to track.

NO. 4: Due to Delany's short stride and erect trunk, you can note a very low back kick. Those who use "foot fall" to swing knee and leg into next stride have learned that "the higher the back kick, the longer the stride."

NO. 5: Of interest here (as you glance at photos on either side) is Delany's almost total lack of bounce—an extremely desirable feature. Men who bounce usually do so because of very long strides and the resulting temporary checking of momentum as lead foot hits track.

NO. 7: Note Delany's foot dropping down toward track. It appears as though it will land heel first, but it won't, as body is coming forward over foot. Foot will land on "ball." Complete action is "ball-heel-ball."

NO. 8: Completion of leg cycle. Remember, style never made a runner, and it's a mistake to copy someone else unless that style is comfortable and natural.

PHOTOS - SCHOLASTIC COACH

PHYSICAL FITNESS AND NUTRITION

-- Thomas Kirk Cureton, Ph.D.

A few basic principles can be stated which, in our experience, have proved themselves for improved physical fitness. In general, it can be said that hard exercise, coupled with reducing the intake of fried foods, eating more red-green-yellow vegetables and fruits, and adding wheat germ oil and wheat germ supplements to the diet, produce very beneficial and measurable changes, which we have measured time and again over the past 15 years of this work. These principles are:

1. Promotion of blood flow by means of hard systematic rhythmic endurance exercises, over 30 minutes to an hour per day, strengthens the circulation, opens up many capillaries which are otherwise unopened, strengthens the heart and improves the function of the blood vessels. Over a period of several weeks or months the pulse rates will slow, the stroke volume of the heart will increase, the peripheral resistance will lower along with the blood pressures.

2. Swimming in cold water, or proper use of cool showers and baths preceded by warm-up exercises, will improve muscular tone, gradually improve the circulatory-respiratory fitness, reduce nervous tensions and result in a warm and healthy feeling. The water pressure itself is important but swimming also involves rhythmic movements which are not too hard nor too fast. They promote blood flow in an optimum way. The stimulation of the cool water on the skin produces a mild vaso-constriction in the skin which drives the blood inwardly, thus giving better supply to the inner organs, glands, heart, nervous centers. A feeling of calm refreshment results after the initial adjustments are conquered.

3. Ultraviolet light, taken three times per week, in full body exposures but in moderate dosages, will act as mild exercise to lower the pulse rates, and the blood pressures, to increase the basal metabolism and to increase the production of Vitamin D in the skin. Various cardiovascular tests will improve as a result of this program alone.

4. Reduction of the fried foods, especially those which may be overfried and stale, from the diet, along with reduction in heavy cream, ice cream, pie crust, cake, and white sugar from the diets of those who are too fat, is basic. Carbohydrate in the form of mashed potatoes, baked potatoes, boiled potatoes and in beans and toast should not be eliminated but should be eaten in moderation.

5. Wheat germ, wheat germ oil, whole gains, natural fruits and vegetables, skimmed milk and an all-around vitamin supplement should be included to a larger extent in the diet. Fresh soy beans, lima beans, green beans and carrots, whole grain cereals and lean meats, especially liver, should be included, also.

Wheat germ oil and vitamin supplements should preferably be taken just before or just after exercise, at least 3 to 4 hours after the previous meal when the stomach is practically empty. Utilization is aided by this procedure.

6. Vitaminized yeast and acid phosphate may be added as dietary supplements.

7. Fruit juice should be taken regularly and in considerable quantity. Reports have claimed it acts to increase the alkaline buffering properties of the blood and also to reduce capillary fragility.

8. Emotionally satisfying activity--sex, hobbies, recreations, etc., are needed in reasonable proportion to the amount of routine and monotonous work to secure a balance of work, play, recreation.

9. Wholesome experience in living is usually not complete without religious experience, trust and faith in the goodness of nature, dependence upon the Almighty God to strengthen morale.

10. Every year for several months a moderate and progressive conditioning program of physical exercise is needed usually in addition to what we call sport, in which one tries to meet standards of fitness. Various tests should be taken to determine levels of physical fitness and efficiency. Test records should be kept in a workbook or folder. Scores should be matched on standardized scales. One's profile of fitness should be reviewed every year.

11. Outdoor living, including moderate exposures to wind, sun, cold, water, natural hours of sleep following hard work should be followed for at least one month of every year. More camping should be done during vacations. This should be supplemented by weekends of camping, hiking, swimming, archery or shooting, sailing, boating, canoeing, fishing, nature study, skiing, or climbing.

12. Moderation in the consumption of alcoholic drinks and the use of tobacco, and sensible eating will permit higher levels of fitness. Starvation is not recommended except in the case of food poisoning.

13. Playing a different sport each season will add fun and companionship. Few of the adult sports are adequate to bring about genuine fitness. Volleyball, golf, bowling, shuffleboard, cycling and boating, fishing, once per week is apt to be disappointing. These sports may be helpful if done every day.

14. Most of all, it is regular day by day training, some form of endurance exercise every day, which is needed to the point of perspiration. There is never an end. A variety of activities should be used to prevent monotony.

15. Medical and dental help should be promptly used when needed but medical inspections alone will not make anyone fit.

Comment on Some Nutritional Matters

I am prompted to make a few observations from my experience and insight to athletic training with respect to some nutritional matters. These come much more from an extended experience, rather than from any written theoretical material from nutrition textbooks. A recent study of "feeding of athletes" has resulted in a conclusion that athletes do not need any special type of feeding. This is a short-sighted conclusion. A recent study of University of Illinois athletes showed that they ate few fruits or vegetables. They do drink considerable milk and milk products. Perhaps they do eat too much ice cream, drink too many milk shakes and malted milks, and eat too many fried foods. In my opinion, they do eat too much fattening food, including grease-soggy hamburgers, fried hot dogs and fried potatoes. Some of the ice cream and milk shakes could profitably be replaced by more ripe fruit and fruit juices, raisins, dates, grapes, or dried fruit. More use should be made of baked or broiled meats and fish.

Any baseball club manager will tell you of the wide fluctuations in weight and fat which occur in players when they stop playing at the end of the season. A few do not put on weight but most of them do. They give up exercise and eat as heavily as ever. Keys has pointed to the fact that Americans eat too much fattening food compared with other nations, and that they have too much faith in bed rest. While Keys considers this large intake of fat a primary cause of arteriosclerosis and coronary trouble, I consider a high fat diet essential to endurance and cardiovascular fitness in athletes as it is measured by our objective tests. There is some support scientifically for this position outside of our own observations.

In 1939 Drs. E. H. Christensen and Ove Hansen, of the physical education laboratory at the University of Copenhagen, reported that they obtained much more efficiency in terms of time one could ride at a set pace on a bicycle ergometer when pre-fed on a carbohydrate diet compared to a high fat diet. The best performances were obtained on a carbonhydrate diet of 60 grams with not more than 20 grams of fat per 24 hours. This work was done at the rate of 1080 Kgm./min. Blood sugar was unchanged for the first 180 minutes, and then the respiratory quotient (CO_2/O_2) steadily declined as carbohydrate exhaustion developed. These experiments showed that 2 to 3 times as much work could be done on carbohydrate feeding compared to fat feeding.

The U.S. Army has recommended ratios of 4 to 5 to one of carbohydrate to other foodstuffs for men on hard physical duty. Low blood values of sugar and carbohydrate, along with the presence of acetone bodies, were always associated with poor endurance performances. Especially is carbohydrate valuable in aiding men to resist cold temperatures.

While the search has gone on and on for effective ergogenic aids which athletes might use, all athletic coaches know that it is impossible to develop high levels of endurance by any type of feeding alone. There is no substitute for hard physical work. A number of experiments on humans with gelatin, phosphate, alcohol, ascorbic acid, vitamins, and alkalizers have not shown significant improvement attributable to the dietary supplements. But no one doubts the great value of certain of these dietary aids in cases of genuine nutritional deficiency. Few of these experiments have lasted long enough to really count and fewer yet have tested with exercise hard enough or fast enough in pace. Many are uncontrolled.

Except in over-training and staleness, any curtailment in the program of physical training will lead to poorer performances. Endurance capacity develops almost in proportion to the amount and duration of the endurance exercises taken, as shown in the 7-year laboratory records of Emil Zatopec

and from experience of other great endurance stars like Roger Bannister, Joie Ray and others. Runners who have copied Zatopec's training methods, like certain of the Russian and Hungarian runners, have greatly improved. This has not been due to any special diet but to more work involving repetitious 400 m. runs, 30-60 per day and less long continuous running.

In the athletic world there is very little faith in alkalizers, and Dill's experiment failed to give any hope for this approach. However, there is some trend of evidence for the use of fruit juices to help performance, although under certain conditions and feeding over a short period even this is doubted because adverse weather conditions, psychology of defeat and other such disturbing variables overshadow the results. Gelatin probably gives no direct aid but its influence is probably negatively good in that it may prevent athletes from eating so much pie, ice cream and cake for dessert instead of simple fruits and gelatins. Physicians have reported helpful results in improving muscle strength by glycine feeding without exercise, but such experiments have failed in the athletic world with the normal range of subjects. But some positive evidence in favor of gelatin has been found.

The great surprise is the contradictory evidence about Vitamins B_1, B_2 and B-complex vitamins. In general, it has been hard to show that vitamins help performance. Montoye failed to get improvement with Vitamin B_{12}. There is some evidence that Vitamins C and P help maintain the efficiency of blood vessels, as reported by Gale and Thewlis and by Hines, but others have failed to verify the positive effect of Vitamin C upon athletic performances, except that there is a small trend to prevent muscular soreness, not considered very significant.

Salt has been routinely used in the iodized salt form to prevent cramps; phosphate compounds have been used to help endurance in Germany; and ultraviolet light is considered helpful if not overdone. Karpovich has suggested hormones, but experimentation is not definite enough to say anything about this area yet, although certain hormone-like effects have been attributed to wheat germ oil.

Sugar feeding has been tested only on relatively short work but the dramatic failures of Jim Peters in the 1952 Olympic Marathon race and also in the 1954 British Empire Games probably indicated low blood sugar, which adequate pre-feeding with honey and wheat germ oil would have remedied.

Two areas stand out in significance. One of these is the use of wheat germ oil and wheat germ, and possibly fresh whole wheat products in general. The experiments on wheat germ oil and wheat germ, directly in the performance field, at our laboratory in Urbana and in the nutrition laboratory of the University of Southern California, have been encouraging. These effects are not attributed to Vitamin E or to poly-unsaturated fatty acids but to other unidentified factors. Crystals from wheat germ oil have also helped endurance in events as long as a mile run.

Ershoff and Levin obtained support for these findings of ours by similar work with guinea pigs in which they were swum to exhaustion. Advantage was shown for both wheat germ oil and crystals of wheat germ oil. We have found similar trends on children in a 600-year run and in all-out squat jumps. The puzzling feature of this work is that some subjects are improved so much and others are not improved. It forces recognition of the principle that individuals are very different. This variability has minimized the averages but the trend has definitely supported the use of these derivatives of wheat for helping physical performances and for improving several cardiovascular and reaction time tests used in our battery. We have learned that individual longitudinal study is the best research method, using concomitant variation design. The fact that the results appear in non-will power tests like the brachial pulse wave and the T-wave (CB-IV-VO) and in certain pulse rate and blood pressure combination tests like the Schneider Test, indicate that the effects cannot be just psychological. We have clearly seen though that the best changes have been obtained in subjects who have apparently badly needed the supplements and then have suddenly begun to use them. In second and third experiments repeated on the same subjects they do not continue to improve. These results seem helpful enough for us to recommend the use of these ergogenic aids (wheat germ oil and wheat germ) to all people seeking better fitness and to athletes, who want to maintain top level fitness over long periods. There does seem to be evidence that wheat germ oil and yeast supplementation will help to prevent athletic staleness.

The other area is a negative approach. Kellogg led a crusade some years ago against high fat content in athletic diets. Practical experience of coaches seem to support this, as well as several lines of experimentation. We know that when blood pressures and pulse rates are typically higher than normal, especially after test exercises, that the efficiency of the overweight older man is poor, more than likely due to fatty blood vessels and heart. We have made an extensive study of these post-exercise blood pressures but the full data are not yet published. Theories of excess fatty

lipids in the blood and tissues fit with this idea. Men with fit blood vessels can adjust to exercise, showing lower diastolic blood pressure 1 minute after hard exertion.

Chapman and Gibbons have criticized the rice-fruit diet as inadequately fortified and lacking in amino acids and minerals, but it significantly lacks the fried fat so stremuously criticized by Krogh and Linhard, Kellogg and Ivy, Christensen and others. This type of rice-fruit diet, fortified with vitamins, skimmed milk, amino acids, Brewer's yeast, and with ample poly-unsaturated fatty acids from fresh foods like lettuce, cold slaw and carrots, seems to be strongly indicated. Marked improvements in endurance and in cardio-vascular-respiratory fitness have been noted on this type of fortified diet when combined with rythmic endurance exercise.

It is not fully known whether the improvements are due primarily to the type of diet or to the use of exercise with the diet. Our feeling is that the improvements are mainly due to exercise, which would be natural for us to champion, but several times we have obtained greater improvements with the addition of wheat germ oil or wheat germ added as supplements to exercise than from the exercise program alone. These results have been obtained by comparing matched groups of men who have needed exercise: one group taking only exercise, one group taking the same exercise plus the wheat derivative, and both compared with a matched group of subjects on cottonseed oil placeboes (or on nothing). It is probable that an unknown ingredient helps the deposition of glycogen reserves in the muscle. It is known that amino acids are converted to glycogen in the liver. If exercise is long and hard this probably occurs.

Inactive groups fed the wheat derivatives have not improved much except one group which was taken from an automobile plant in relatively low levels of cardiovascular fitness. Perhaps the way we have fed the supplement has something to do with the results. We always fed the supplements to men with relatively empty stomachs, three to four hours after breakfast. They took the capsules in combination with noon-day exercise periods. Their bodies were thoroughly warmed up and this should have helped the utilization of whatever we fed them.

The capacity of various physical types to use the food that they eat, and to take in enough oxygen to use it, varies very greatly. This fact is very impressive to us. The use of oxygen improves with endurance. Athletes usually have higher basal metabolism by 7-10% and may have 200% greater oxygen intake capacity in hard all-out endurance work on a treadmill. From animal research it may be presumed that eating sufficient raw carrots and carotin, that some added resistance to oxygen want may be obtained. The fit person usually has high utilization capacity and averages a higher metabolic rate at rest or in all-out exercise. Why is this so? We think that the key to this is circulation, improved by physical training, in which the greatest possible number of capillaries are opened up and new ones developed. The better chance cells and tissues have to breathe, and to get vital nutrients, the better they should function, the more oxygen they should use. To deprive any part of the body of its normal full circulation is to starve it, to inhibit its metabolism, and before long that part will develop fatigue or fail. This seems to be the reason why exercise teams do so well with good food.

Why nutritional people have not seemed to appreciate the point that people can live more dynamically, enjoy their food and eat more of it, if they exercise, is hard to understand. Most nutritional experts have shunned exercise as if it were some monster. But exercise moves blood (including oxygen, water and nutrients) into the tissues and flushes them with needed supplies. All of the joints work better when exercised. The joint membranes thicken and can withstand shock better. Lack of exercise and food causes one's spirits to deteriorate, causes poorer feeling tone, loss of optimism and confidence.

When there are nutritive deficiencies caused by inadequate intake of water, foods or minerals through the mouth or stomach, there may result marked types of nutritional deficiencies. It is not my point to minimize the frequency of this aspect but, as I see it, the angle which I am emphasizing about the value of endurance exercise is even more needed. Many individuals have adequate intake and many are over-fed; but they have relatively poor circulation and poor metabolism at rest, and expecially in work. They are physiologically and even psychologically inefficient. They never use enough of the food that they take into their mouths and stomachs. They become stuffed, puffed, and obese. Their physical fitness tests go down and down as years go along if they avoid endurance exercise.

CLINIC QUESTION AND ANSWER PANEL

(Q) What type of general training and competition programs do boys of age 12 - 15 have in Europe?

(A) by Chic Werner.
I've been told that kids from the age of 15 up belong to clubs. They don't compete against each other in high school as we do. Each club has a manager, coach or trainer. In Finland, the head coach, Armas Valste, has laid out programs for boys of varying abilities for a whole year at a time. As they get into another class they follow the chart for the next stage. They wait until boys are comparatively mature before they let them enter open competition in the championships.

(Q) To your knowledge, have there been any studies to prove that any race or heritage should perform better than another?

(A) by Arthur Wint.
There are many factors to be considered; for example, geography and geographical location, and the effect on the national temperament, irrespective of race. Consider also discipline and determination in the training program and the impact of science. Only where these are present do national geographic boundaries break down. Swedes excel in endurance; Japanese in gymnastics and the kindred events, broad jumping and pole-vaulting. The characteristic physical stature of the athlete is also a determining factor. But there is nothing basic in national or racial distinction.

(Q) 1. What type of mile relay pass would you use for High School?
2. Do your teams use the inside pass?
3. What touch-off distance do you use in the 440 relay?

(A) by Ed Hurt.
In indoor races, the first and third man will pass on a turn. In the straightaways you might use an outside pass. But we simplify matters by using one pass, the inside pass, give with the right hand and take with the left hand. We reach back with the left hand, palm down, thumb inside. We do this always, in all races. We used to use the palm up and out, but found there was more danger of getting the stick knocked off. Now as to the distance of the take-off in a sprint relay, that must be determined by practice, depending on the speed of the incoming man. Some use up to eight yards; most, however, use six. After you have determined the distance, make a mark. It is very important in the pass that the hand be kept steady. The responsibility is on the incoming man. We don't want the outgoing runner to take the stick. The runner places his hand all the way up until he touches the hand of the receiver.

(Q) How far do they run before the hand goes back?

(A) Start running in place, then when you take off, run - and about three or four strides out the hand comes back and remains stationary. We do not believe that incoming man should pass the receiver in a sprint race. We believe the runners are merely carriers. The baton must be moved as fast as possible at all times.

(Q) Do you always use the inside pass, whether indoors or outdoors?

(A) Always.

(Q) Do you prefer the same mechanics in the pole vault at heights of 8 ft., 10 ft., 12 ft., or 14 ft.?

(A) by Lloyd Duff.
Use the same action, regardless of height of the bar. Two hand grips are advisable, one for the warm-up; then, regardless, of the height, take the maximum grip and always vault as high as possible. Don't change the timing. At higher heights, the boy may run faster so the grip could be moved up. Many boys hold higher in meets.

(Q) We have beginners doing six to eight feet. We get to plateaus, so I'm not satisfied that the mechanics are the same at various heights.

(A) I don't think it matters where the bar is. Vaulting at six feet, the boy is not on the pole long enough to do a swing-up. Start out working without the cross-bar, getting the feel of the swing until they can get their feet up to their hands.

(Q) How much over-distance do you give your 440 men during the regular season?

(A) by George Eastment.
My men run cross country in the fall about 45 minutes a day, for four or five days a week - without competition. After we get inside we run halves and 600's, but as the season progresses we run two 600's on Monday and no more over-distance the rest of the week. The later in the season, the less overdistance we do. I do not believe in overdistance if the boys have the base. The same goes for half-milers to a great extent.

(Q) What kind of a pass do you use in the mile relay in indoor competition?

(A) We use the same pass as Ed Hurt, but in the mile relay, the pass is completely visual. The semi-visual pass may be somewhat faster - but the slightest mistake will lose you yards. This is particularly true in crowded fields. In a real close race, I might gamble with the blind pass.

(Q) Do you think a javelin thrower should do weight training?

(A) by Frank Wetzler.
We don't have weights and the facilities for that kind of training. We did a lot of push-ups, chin-ups, and that sort of thing. But if we had weights, we would use them. We have to improvise.

(Q) Why is the Held javelin so popular?

(A) Because they throw it farther. The Europeans now have a javelin similar to the Held - (Snyder). In the Olympic games, they were throwing into a strong wind and they immediately picked up a steel javelin. Our kids were behind.

(Q) How often should a hop-step and jumper jump for distance during the season?

(A) by Frank Wetzler.
The boys worked hard and jumped as much as they could stand. There's no such thing as too much, and remember, the boys were relatively inexperienced.

(Q) You said that performing numerous repetitions of exercises will develop endurance. What do you mean by endurance?

(A) by Irv Kintisch.
Endurance is the ability to repeat movement over a period of time. Repetition of an exercise will increase endurance for the particular set of muscles used in the exercise. Of course, being able to do 30 push-ups doesn't necessarily mean that you are going to put the shot any further.

(Q) I have a high school senior, 17 years of age, who ran a 4:45 mile in his junior year. How would you set up an interval training program for him?

(A) by Gil Dodds.
I'm not 100% sold on the interval type of training. I like a combination of the various types of
(Q) running, over-distance, under-distance and interval. I use over-distance to give the boy confidence that he can go the distance. I find out what the boy's 440 time is and then go on from there. When the quarter time falls the rest of the race will go down with it. I try to work in some 110's (if the weakness is speed) and vary between 220's and 300's. But most important, I'd work on the quarter to get the time down.

(Q) The statement was made yesterday that the best exercise for vaulters is vaulting. Should vaulting be done every day? Would the same thing be true of other field events?

(A) by Larry Snyder.
I wouldn't recommend it. There are many other things a vaulter can do. Meadows and Sefton, who vaulted 14' 11" in college, vaulted only three times a week. The other days were given over to gym work, on the apparatus, etc., to build up the body and improve coordination. I don't recommend too much vaulting. When a boy is tired he can slip into bad habits, and after that his practice will only fix these habits. I certainly wouldn't jump a high jumper every day. Three days a week are ample. High jumpers should run a lot, and, of course, many of them

compete in other events; but as a rule, not too much jumping. Spring is something that can be stored up. The same thing is true of the broad jump. The boy can run through and do pop-ups, but not too much actual jumping. Now in the weight events, the men can throw every day, excepting the javelin, of course.

(Q) How can shin-splints be prevented when you have to practice on hard surfaces, say cement or on asphalt yard? What treatment do you use to cure it?

(A) by Ed Hurt.
Running on hard surfaces brings on shin-splints. It happens every year when the boys come in to the boards after running on the grass. We use heat and hot applications and the whirlpool bath, resting the boy for about ten days. We find practicing in cushion-soled shoes will help.
(From the floor) We have the idea that one of the causes of shin-splints is splay-footed running, tending to toe out.
(George Eastment) I don't think hard surfaces have anything do do with shin-splints. We think that every boy who gets shin-splints has an odd way of putting his foot down, or something else wrong.
(Larry Snyder) I think it's caused by running too hard too soon.
(George Eastment) The medical profession knows less about shin-splints than they do about cancer. We use flats as long as we can, and use spikes for meets.

(Q) Discuss the crouch vs. the standing start for the High School quartermiler.

(A) by Leo Johnson.
I consider the quartermile a sprint race, so I think all 440 men should start in a crouch position. If I can say a few words about shin-splints: I had a sprinter with shin-splints, and Smith, on our football team, had a bad case. Valste says that the muscle that runs down the tibia should be separated from the bone. But down lower, Smith's muscle was against the bone. Valste says they work on separating the muscle from the bone.

(Q) Do you know of any research on the value of High School putters using a 16 lb. shot?

(A) by Irv Kentisch.
I don't know of any research on the subject. Overweight training has been going on for many years. It probably builds strength, but there is the problem of the coordination and timing being different. Lampert had a 20 and a 24 lb. shot. He threw the overweight from a stand.

(Q) Is it definitely known what causes fatigue? Is the presence of a superfluity of lactic acid in the muscles a cause or an effect of fatigue?

(A) by Arthur Wint.
Lactic acid itself is not the direct cause of fatigue, although its accumulation in the muscle reduces the viscosity of the muscle. Actually, it is the nervous tissue which becomes fatigued. The impulse from the nerve is transmitted through a chemical substance, and when fatigue comes into the nerve the antagonist substance stops the impulse from coming through.
(Doherty here suggested that fatigue is mental and psychological as well as physical. He recommended the book "Fatigue and Impairment", by Barclay and Chute.)

(Q) What is the treatment for a pulled muscle?

(A) by George Eastment.
Frankly, I don't know - other than rest. My readings on the subject have been contradictory. At Manhattan I don't have any say about the treatment; this is in the hands of our team physician and trainer. I must mention that some people are prone to mistake muscle cramps for pulls. The cramp will heal itself very quickly. As far as treatment for the pull is concerned, I think the old saying goes: "With a doctor, two weeks; without a doctor, 14 days."